JUNE • 1959

FIREMEN

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Grain Storage Building Fire — *see page 7*

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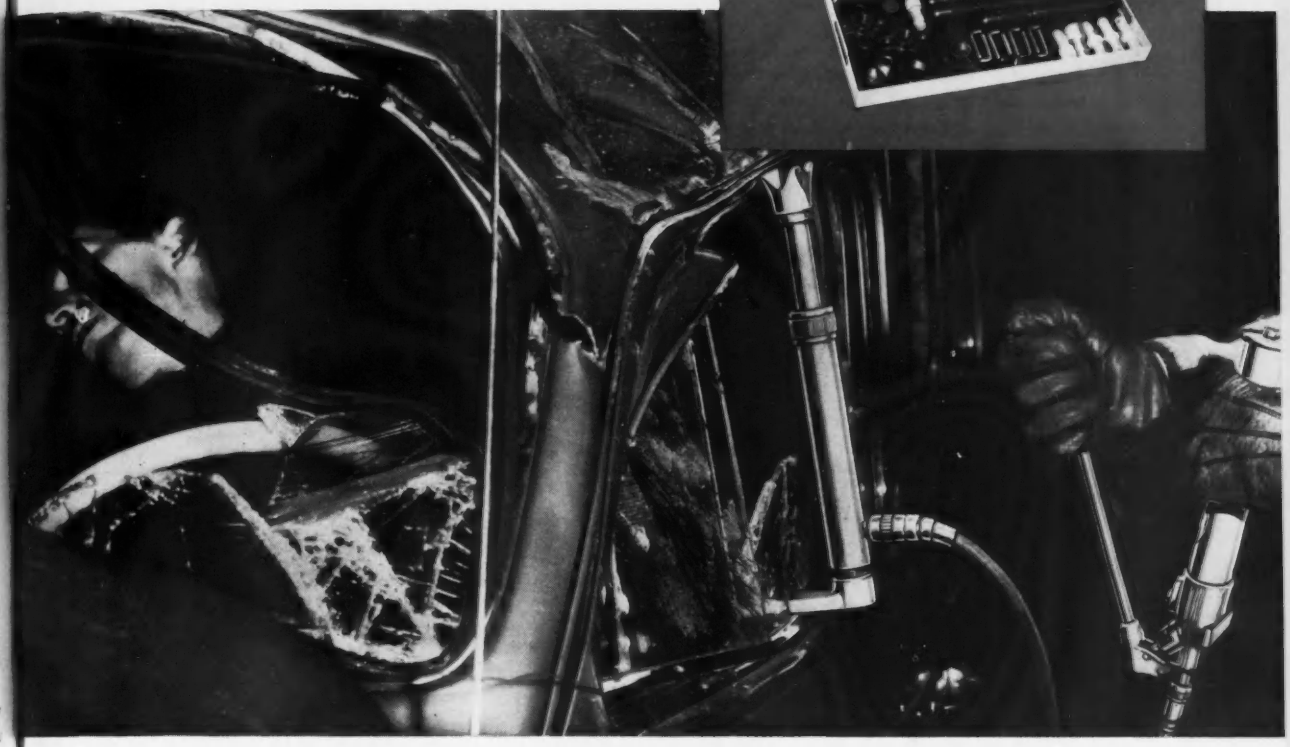

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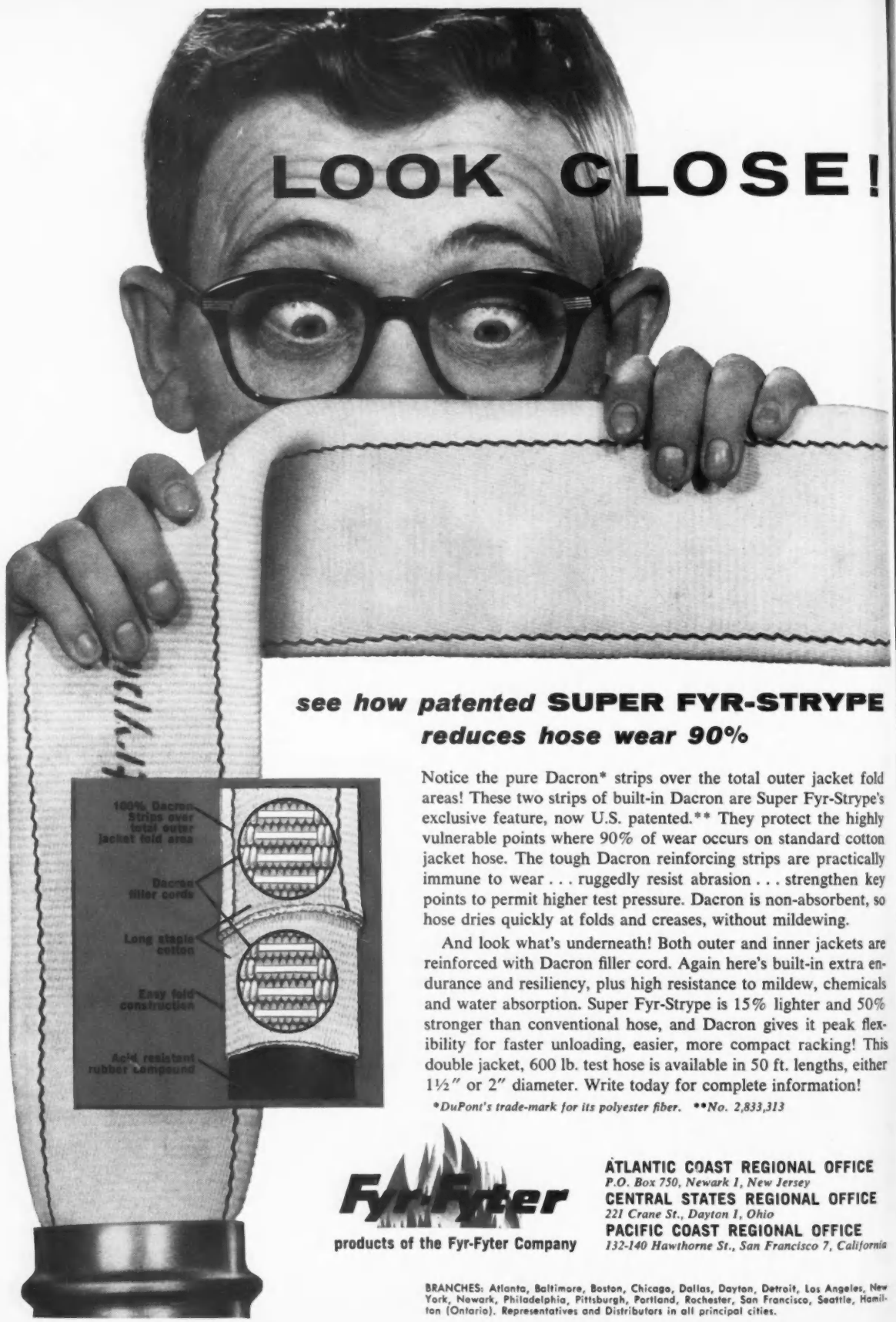
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One Massachusetts town which has a public tax-supported fire department, proposes to bill persons responsible for needless grass and brush fires an average sum of $25.00 regardless of whether these persons have permits for open fires. This is an attempt to curtail the number of fires on dry, windy days.

Actually, the law permits higher fines and jail sentences for illegal burning, but there is always the problem of public reaction to enforcement of such regulations except in areas where the danger is publicly recognized. All too many local authorities have accepted the unfortunate results of illegal burning without attempting to enforce penalties.

Public discussion has included the observation that it may be undesirable to make a charge on the basis of the cost of fire suppression (as proposed in this instance) because the taxpayers have already paid for such service. Also, there is the factor that, when charges are assessed, people will attempt to put out the fire themselves and may seriously delay the alarm in an effort to avoid the penalty. It is an established principle of law that, where fire results from violation of law or ordinance and damages property of another person, the aggrieved parties can seek to collect by civil action from the individual responsible. Where loss of life or injury results following violation of fire regulations, there may be cause for criminal prosecution.

In some countries the principle of liability for fire damage is much more clearly recognized than in the United States, where basically the public sympathies have been toward the individual suffering the fire. It would seem that if charges are to be made in an attempt to curtail illegal burning, they should be on the basis of legal prosecution for failure to obey fire safety laws and ordinances, rather than to recover costs of fire protection.

One other pertinent observation might be that the assistance of police authorities should be sought to see that all burning is being conducted as prescribed by law.

More and more areas are recognizing the seriousness of promiscuous burning and are instituting fire prevention patrols with light vehicles equipped with small pumps and water tanks. In discussing this matter an editorial in the Worcester, Massachusetts *Telegram* states:

". . . communities faced with the same problem might do better to take advantage of the other penalties provided under the law. A rigidly enforced system of fire permits would certainly go far toward meeting the problem. And if anyone is to be penalized for negligence, the best way to do it is in court, not through a bill from the local fire chief for services rendered."

●

In Blackwell, Oklahoma, as shown on this month's cover, fire involved a wood frame, metal-covered grain storage building on May 14. About 8,000 bushels of grain, plus grain handling equipment were in the building. The Blackwell Fire Department, headed by Chief Russell Cardwell, had assistance from fire companies of nearby Ponca City and Tonkawa, and exposed structures nearby, including a 150,000-bushel capacity grain elevator, were well protected. Loss to the involved building was estimated at $150,000. (*Cover picture by Blackwell "Journal-Tribune"*. For other pictures see page 11.)

INTERIOR FIRE FIGHTING OPERATIONS

Here is an important article for all fire fighters! It is reprinted from a bulletin of the Wisconsin State Board of Vocational and Adult Education. It was written by William E. Clark, Supervisor of Fire Service Training in that state and retired Battalion Chief of the New York City Fire Department.

The Men Who Work Inside

Should you chance to see a fire
On your city's thoroughfare,
With the ladder trucks and engines
And the water in the air,
And the speed of your department
That you laud with civic pride,
Then will you give a thought to
The men who work inside?

Now if you want sensation
Just don a rubber coat,
And follow in a line of hose
Through water, heat and smoke;
There you'll find the scene of action,
Where men's grit and strength are tried,
But the smoke won't let you see much
Of the men who work inside.

If it wasn't for the darkness
You might know what happens there,
But you'll feel your eyeballs aching,
And you'll note the lack of air;
If a wall begins to topple
Or a floor begins to slide,
You'll only take the chances
Of the men who work inside.

There are duties that require
Outside work at every fire,
And the men who fill these places
Cannot justly be decried;
But still the hidden actors
And the most important factors
Are the men behind the nozzles —
The men who work inside.

So if you feel elation
For the fire's short duration
And your fire department justifies
Your surge of civic pride,
Then don't forget to mention,
(For it's fair and just contention)
That the men who knock the flames down
Are the men who work inside.
— Author Unknown

Advantages of Interior Operations

FOR maximum effectiveness in operations at a fire within a building it is essential that members of the fire fighting force enter the building immediately and execute the attack from within. This must be done to find and remove trapped or unconscious occupants and to extinguish the fire promptly.

Many rural fires are lost because fire fighters fail to enter quickly. In order for water to extinguish fire it must come into contact with the burning material either in the form of spray, solid stream, or steam created from spray. In many cases this can be done *only* from the interior; and in most other cases is done more effectively from the interior.

Interior attack may of course involve discomfort and, in some cases, a degree of risk, but this is compensated for by more rapid extinguishment and less water and fire damage. Discomfort can be lessened by the use of proper protective breathing equipment and clothing.

Interior activities at a fire may be divided into two categories: (1) Search, removal of occupants and ventilation, or what is commonly called "truck work" in a metropolitan fire department; and (2) The application of water, or "engine company work."

Ventilation and Search

Ventilation and search can be performed simultaneously. Firemen so assigned can open windows and doors as they search through the premises for helpless or unconscious persons. A diligent search for such persons should be made immediately without waiting for the fire to be extinguished. Fire fighters should bear in mind that children frequently take refuge under beds and in closets, and adults occasionally do, too; these places should be checked carefully. Persons found should be removed promptly to safety and given whatever treatment is necessary. A search should be made at every fire. Statements of excited witnesses are not reliable. It should not be assumed that everyone is safely out of the building until firemen have reached this determination through actual search.

Another part of search is for extension of fire. The travel of fire can be more readily detected from within the building. Walls of rooms above the fire should be felt for extreme heat which may indicate the upward extension of fire through concealed wall spaces. In frame buildings of "balloon" type construction, fire in wall spaces travels quickly to the attic, sometimes going from the basement to attic without showing on intermediate stories.

Points of Entry

The points where firemen should enter the fire building are determined by two principal factors: location of the fire and the purpose of entry.

Entry for purpose of search can be made through whatever doors or windows are most suitable, provided that a thorough, systematic search is conducted. The same is true of ventilation. Entry with hose lines should be made with the objective of cutting off the travel of the fire, rather than following it. Doorways are preferable to windows as points of entry with hose lines because they allow easier and quicker entry and retreat (if necessary).

The first hose line is usually taken through a doorway selected to allow the nozzlemen to reach the fire with the least difficulty, provided this will not put them in the position of chasing the fire ahead of them. The primary rule of fire extinguishing strategy is: *locate, confine* and *extinguish* the fire. Therefore, the nozzle should be brought in from the point that is most vulnerable to the extension of fire, in an attempt to cut off the fire and push it back.

Stairways particularly should be protected to prevent upward travel of fire. There is an old axiom, "Save the stairway and you save the building." For basement fires, some fire departments require that the first line be taken to the first floor interior basement stair to prevent upward extension of fire.

The points of entry for additional hose lines must be selected so that they may work in harmony with the first line. Hose streams create strong air currents that move in the same direction as the streams, tending to push heat and smoke in that direction; therefore it can be harmful to have hose streams working toward each other from opposite directions with each tending to retard the advance of the other.

It is particularly undesirable to direct an outside stream into a building when men are inside. This has the effect of nullifying ventilation and pushing heat and smoke to the interior, often injuring the men inside or forcing them to retreat suddenly. It is the duty of the chief to coordinate the attack and prevent subordinate officers or firemen from directing hose streams in a manner that hinders interior operations or endangers other firemen. Firemen must be impressed with the necessity for overcoming the natural temptation to open the nozzle and direct a stream through a window when other firemen may be advancing within the building.

Protective Equipment and Clothing

Members working within a smoke-filled structure will probably work better and be able to stay longer if protective breathing equipment is worn. However, filter type masks can be dangerous in an atmosphere with insufficient oxygen, a condition which may occur at fires in cellars or other poorly ventilated spaces. Here self-contained masks are valuable.

Men operating hose lines will find that waterproofed coats and boots reduce the chances of getting regular clothing wet, but rubber coats should not be worn next to bare skin as this commonly results in burns. The same is true of unlined rubber or plastic gloves. Cotton, woolen, leather, or insulated rubber gloves or mittens protect the hands from heat and also, to some degree, from cuts. Helmets afford head protection from falling plaster and other objects.

In warm weather, some volunteers respond to fires wearing little or no clothing above the waist. If they attempt to work in a hot area without this upper protection they invite burns.

Equipment

LIGHTS. The officer in charge of a group advancing a hose line must provide illumination as well as guidance, because the other members need both hands to hold and move the hose line. He should carry a powerful flashlight or electric lantern. Each fireman detailed to perform search and ventilation should carry a flashlight since he operates individually.

HAND TOOLS. It is desirable to have a man carrying forcible entry tools accompany the members advancing the hose line, so that locked doors may be readily forced, ceiling and wall spaces opened quickly, and burned materials pulled apart without the delay that would be caused by sending back to the truck for such tools. A six-foot pike pole, a claw tool or similar tool or an axe would be suitable.

Each member performing ventilation and search should carry a forcible entry tool to use as may be required and should then *report*, when these duties are completed, to the officer in charge.

HOSE AND NOZZLES. The selection of the size of hose to be used is dependent upon the size and type of fire and available water supply. Fires in dwellings can usually be handled effectively by lines of 1½-in. diameter, but barns or other large area buildings may require streams from 2½-in. lines. Available water supply may limit the size of hose and nozzles. The important thing is that the officer in charge does not underestimate the fire and as a result begin attack with an insufficient volume of water. Officers and firemen should know what each nozzle discharges at given pressures and then select the right nozzle for the job. This is especially important where a tanker shuttle is being employed and there is a possibility of running out of water.

When to Enter

Entry should be made as soon as possible. For the company advancing a hose line, this means as soon as the line is charged with water. However, if the fire is above the first floor, the men should advance as far as they can before the line is charged and wait for water at a point near the fire but not where they would be cut off by it.

How to Advance

Where conditions of heavy smoke or heat prevail, better progress can be made if the men are relieved frequently. If sufficient masks are not available, members working without masks should not be subjected to severe exposure for more than a minute at a time. When a man is relieved he should go to a window, or wherever he can get a few deep breaths of fresh air, and then return quickly to provide relief for another.

The officer in charge of the line should make every attempt to keep it moving forward. A line that does not advance is not being fully utilized. An adequate hose stream will put out all the fire it can reach in a few seconds. If it is not moved, any additional water used from that position is being wasted. The line must be kept moving throughout the building as far as necessary to bring the nozzle to points where it can hit the remaining fire.

Members should not "bunch up" near the nozzle; they should be spaced at intervals along the hose line. When the line is not being moved, it should be allowed to rest on the floor. When the command "more line" is given, the men should then pick up the line and move it forward until ordered to stop.

Safety Precautions

The hazards to firemen working within a building depend largely upon the type of structure. In an ordinary dwelling these hazards generally consist of the possibility of men falling through holes in the floor or down stairs. In other structures, however, there are additional hazards; for instance, in a barn the floor of a heavily loaded loft may collapse when weakened by fire; in large area mercantile or industrial structures there is a possibility that roof or walls may collapse. There are also hazards inherent to various types of industrial occupancies which should be learned through inspection and pre-fire planning. In addition, with any fire that is well advanced there is the problem of smoke. Even if masks are worn, reduced visibility presents many problems. When a man gets lost in the smoke within a large area structure, he tends to wander aimlessly in search of an exit. If he does not panic and follows the cracks of floor boards or the seams in concrete floors, he will inevitably travel in a straight line until he comes to a wall; he can then follow the wall until he reaches a door or window. If retreat with a hose line is necessary, men can follow the hose line to a place of safety. However, when a hose line crew is

forced to retreat, the men should make every effort to withdraw the line with them so it can remain in service.

Application of Water

The nozzle should not be opened until it is in a position to hit the fire. Streams should not be directed injudiciously at smoke. The alert officer will make certain that the nozzle is advanced to a point where fire can be seen before he gives the command to open the nozzle.

The nozzle, whether fog or straight stream, should be directed upward, when open, and moved about rapidly to get the greatest coverage. Straight streams can be directed at the ceiling over the fire so that the water will bounce off the ceiling and come down like rain over a large area. Fog should also be aimed toward the ceiling because the greatest amount of heat is concentrated there. Both types of nozzles give maximum effectiveness if rotated rapidly.

Usually in a hot, smoky atmosphere within a building the nozzleman will operate most effectively if he gets down on one knee, aims and opens the nozzle, and moves it as described previously until the portion of the fire that can be reached from that point is darkened down. He should then close the nozzle and move quickly in a crouching position to the next point from which fire can be seen and repeat the operation. When he is about to move forward he should call for "more line" and the men behind him should move the line forward. The nozzleman should not have to pull the line or otherwise exert himself, and if a 2½-in. line is being used, the man behind the nozzleman should take up the strain caused by the nozzle reaction (kickback).

Opening and Closing the Nozzle

When the nozzle is opened for the first time, a considerable amount of air trapped in the hose line will be pushed out ahead of the water. If the nozzle is being aimed at the fire, this air may accelerate the fire; therefore the efficient thing to do when opening the nozzle for the first time is to hold it close to the floor, aimed at the floor, opening it slowly until the air is discharged. The nozzle is then closed, aimed over the fire and reopened. This procedure is not necessary after the nozzle has been opened once.

Nozzles should not be opened too quickly or the sudden release of pressure may wrest them from control. Nozzles should not be closed rapidly because the sudden closing will cause "water hammer" that may burst the hose line.

The Position of the Officer

The officer directing a hose line should not attempt to be a leader in the literal concept of the word. If he gets ahead of the nozzle he may obstruct operations at times. His most practical post is directly behind the nozzleman in a position where he can best see the fire, observe the operation of the nozzle, give orders to the nozzleman and urge him forward at the right time. He should make sure that the nozzle is being operated properly and that it is not kept open after "darkening down" the fire. He should see to it that the man on the nozzle is relieved when necessary and that the other men relieve each other as frequently as conditions require.

Compact Mobile Lighting Plant

THE Tri-State Fire Department, just outside of Hinsdale, Illinois, recently acquired this interesting utility vehicle. Built by Fyr-Fyter Company, 221 Crane Street, Dayton 1, Ohio, on a Jeep chassis, the truck has dual rear wheels, four wheel drive, a winch and cab over engine. A special rack carries a 2,500 watt Onan electric plant. There are four Circle D "Model 150" portable spotlights, two 200-ft. reels of flexible wiring and a built-in battery charger for servicing other vehicles.

There is a 500 gpm pump, a 250 gallon water tank and a monitor nozzle mounted inside the cab. Three 20 gpm fog nozzles are fixed to the front bumper and a reel of 1½-in. rubber hose with a fog nozzle is preconnected at the rear of the truck. The pump can be operated while the vehicle is in motion. Pump controls and gages are at front and rear.

An MSA pneolator is carried in a special snap-out rack and there are also two Scott "Air-Paks," four "Dragon pumps," two axes, a pike pole, a Halligan tool, two dry powder extinguishers and four "Big Beam" hand lights. The truck also has two-way radio with a public address system.

New Forest Fire Truck for Uxbridge

The Uxbridge, Massachusetts, Fire Department, recently acquired this 1958 Ford truck for forest fire fighting. It replaces a 1930 Studebaker truck that had been in service for more than 20 years. Built by the Farrar Company of Woodville, Massachusetts, this new truck has a 500 gpm front end pump and a 350 gallon water tank mounted on an F-750 chassis. Two lines of 1-in. forestry hose are pre-connected directly behind the cab. Also carried are 2,200 ft. of 1-in. hose and 500 ft. of 1½-in. hose. A 1½-in. discharge gate is at the rear. The truck also carries a 24-ft. extension ladder and a 14-ft. roof ladder, a 200 gpm portable pump and a detachable reel for 50- or 100-ft. lengths of 1-in. hose. It has an electronic siren and public address systems, dual back-up lights and two-way radios. This vehicle and four other mobile units and a base station are on the county radio network. (*Photo by Albin Studio.*)

In New York City on May 9, Ladderman Thomas DeShalmus had to move quickly when fire enveloped this aerial ladder. Despite his plunge De Shalmus was reported to be unhurt. However, eight other fire fighters and two civilians were injured in this five-alarm fire which involved three tenement buildings in the Harlem district of New York City. These photos show plainly the vulnerability of a man on a ladder when flame explodes from a building. The man on the turntable must be ready to provide quick help in such occurrences. (*United Press International Photos.*)

PHOTOS OF THE MONTH

Here are two other views of the fire shown on the front cover that destroyed a building on the property of the Dannen Elevator Company in Blackwell, Oklahoma, on Thursday, May 14. It was reported that $75,000 worth of grain handling equipment and some 8,000 bushels of grain were in the wood frame, metal covered building. A number of explosions that occurred while fire was in progress were attributed to stored fumigants. Fire fighters, particularly those who worked on the ladder truck, suffered minor burns or injuries when these explosions happened. Fire spread was rapid and intense and caused a total estimated loss of $105,000. The major portion of the Blackwell Fire Department's work, directed by Chief Russell Cardwell, consisted of protecting dwellings nearby when sparks and embers flew from the heavily involved elevator structure. (*Photos by Blackwell "Journal-Tribune."*)

FIRE DEPARTMENT MANNING

by Warren Y. Kimball, Manager, NFPA Fire Service Department and Editor, FIREMEN Magazine

IN RECENT years a very substantial percentage of the fire departments in the United States has been seriously undermanned. This is particularly true in cities of less than 100,000 population. In a great many cases three men or less are on duty with engine companies, and two men or less are on duty with ladder companies. Such crews are incapable of operating the equipment effectively, except on very small fires.

For many years there has been general agreement as to the number of engine and ladder companies normally desirable to reasonably protect the communities of various populations. This information may be summarized as follows:

Table 1.

Population (in Thousands)	Desirable Engine Companies	Desirable Ladder Companies
25	4	2
37.5	5	2
50	7	3
67	8	3
75	9	3
100	10	4

Further, there has been quite general agreement in the fire service as to the number of men which should be on duty with each of these companies to provide manpower for optimum efficiency. In high hazard congested districts, it is considered that seven men on duty with each engine and ladder company would be desirable full manning. In other districts, recommended engine company strength is five men and ladder company strength is six men.

Very few fire departments, if any, are able to provide the full extra manning at all times for their high value companies. A number of departments try to maintain company strength at a level of five men with engine companies and six men with ladder companies. The company strengths include officers on duty.

Generally, an element of judgment is involved in determining what fire companies should have extra manpower for the high value district. In a small city at least one company at headquarters might normally be designated as high value, and in larger places several engine companies and one or more ladder companies might be so designated.

Knowing the number of fire companies needed on a basis of population, and the number of men that should be on duty with each company, we can readily determine the total number of fire fighters that should be on duty with the apparatus. To the company personnel would be added the assistant chiefs on duty, as well as their aides or drivers where provided. (Most of the cities of over 50,000 population provide aides for the chiefs on duty.)

The total number of men that must be on duty at all times to fully man the desirable number of fire companies (based upon population) is shown in Table 2. In this table we have arbitrarily designated a reasonable number of companies to have the extra high value manning. An important factor shown in the table (last column) is the number of men that must be on duty per 1,000 population to provide the necessary crews for the fire companies.

In this study we are ignoring the additional men needed for headquarters staff, including the fire chief, fire prevention bureau, training staff, maintenance, and fire alarm men. We are concerned only with the men needed to man the required apparatus.

The days when fire fighters served on continuous duty are long past. Accordingly, to provide the necessary on-duty manning round-the-clock for 168 hours each week, additional manpower is needed. The nominal average work week varies from city to city from 40 to 72 hours. The 56-hour work week which divides the 168-hour calendar week in three equal parts is probably average and is the maximum permitted by law in a number of states. One state has established a 40-hour maximum work week for municipal employees including fire fighters. The 48-hour week is also common.

Of course, the average nominal work week is not the only factor in determining the number of fire fighters required to maintain effective strength. All men are granted annual leave which varies from 14 to

Table 2. Requirements for Full On-Duty Manning

Population (in Thousands)	Total Engine Companies	Total Ladder Companies	Assistant Chiefs and Aides*	Total Fire Fighters on Duty	Men on Duty per 1,000 Population
25	4	2	1	36	1.44
37.5	5	2	1	41	1.09
50	7	3	4	60	1.20
67	8	3	4	67	1.00
75	9	3	4	74	0.99
100	10	4	4	86	0.86

*Aides provided for chiefs in cities of 50,000 population or over.

Table 3. Number of Fire Fighters Needed for Each Position in Various Work Weeks

Nominal Work Week (Hours)	Minus 10% for Vacation and Sick Leave (Hours)	Number Men Needed per Position
42	37.8	4.44
48	43.2	3.89
56	50.4	3.33
64	57.6	2.92
72	64.8	2.59

30 days or more. Many cities grant additional days off in lieu of holidays; also, fire fighters are off duty from time to time due to sickness and injury.

Thus, on the average, the work week is reduced by 10 per cent by these various absences and unless additional manpower is provided to compensate, the fire companies will invariably run short-handed, particularly during vacation periods.

Experienced fire department administrators have found that at least 10 per cent extra manpower beyond that required for the normal work week is necessary. In departments where men are allowed more than average leave the number of men required would be greater than that normally indicated by the nominal work week. For example, one city with a 72-hour work week grants 37 days annual leave which reduces the average hours worked per man.

In Table 3 we show the number of fire fighters needed for each position which must be manned around the clock. These are the values used in the calculations presented with this study.

Even with the manning shown it will be necessary from time to time to detail men from one company to another to maintain the desired company strength. Where several companies are housed together this may be done more conveniently than where companies are in isolated stations.

Knowing the number of men needed to cover each position with stated working hours and the number of men needed on duty we are able to present Table 4, showing the total number of fire fighters needed to man the apparatus called for in cities of various sizes. For example, to have the recommended 36 men on duty a city of 25,000 population would require 160 fire fighters if the men worked a 42-hour week, or 120 fire fighters if the men worked a 56-hour week.

Of course, to many city administrators an important index is the number of fire fighters required per 1,000 population and this information is shown in Table 5. It is interesting to note that the smaller cities require a much higher ratio of fire fighters to population to provide full manning than do the larger cities. This is because the larger cities need somewhat fewer fire companies per 1,000 population. Thus, for a city of 25,000 population to have the recommended number of fully manned fire companies with men working a 48-hour week, one out of every 178 citizens (men, women and children) would have to be a paid fire fighter. On the other hand, in a city of 100,000 population the ratio would be one fire fighter to every 294 inhabitants with the same work week.

In years gone by when fire departments had an 84-hour work week and less other time off, fairly good company manning was provided by 1.5 men per 1,000 population or one fire fighter for every 667 citizens. Today with an average work week a ratio of about 2.3 to 2.4 per 1,000 population is a desirable minimum. This averages about one fire fighter per 425 persons.

Obviously, many cities find it economically impossible or unacceptable to provide a paid fire fighter

Table 4. Fire Fighters Needed for Full Manning with Various Average Work Weeks

Population (in Thousands)	On-Duty Fire Fighters for Full Manning	Fire Fighters on Duty per 1,000 Pop.	Number Fire Fighters Required for Full Manning				
			42 Hours	48 Hours	56 Hours	64 Hours	72 Hours
25	36	1.44	160	140	120	105	94
37.5	41	1.09	182	160	137	120	107
50	60	1.20	266	233	200	175	155
67	67	1.00	298	261	223	196	174
75	74	0.99	328	288	246	216	192
100	86	0.86	382	335	287	251	223

Table 5. Fire Fighters Needed per 1,000 Population For Full Manning with Various Average Work Weeks

Population (in Thousands)	On-Duty Fire Fighters	Fire Fighters on Duty per 1,000 Pop.	Number of Men Per 1,000 Population				
			42 Hours	48 Hours	56 Hours	64 Hours	72 Hours
25	36	1.44	6.4	5.6	4.8	4.2	3.9
37.5	41	1.09	4.9	4.3	3.7	3.2	2.9
50	60	1.20	5.3	4.7	4.0	3.5	3.1
67	67	1.00	4.4	4.1	3.3	2.9	2.6
75	74	0.99	4.4	3.9	3.3	2.9	2.6
100	86	0.86	3.8	3.4	2.9	2.5	2.2

Table 6. A Method of Assigning Effective On-Duty Manning

Population (in Thousands)	Engine Companies: Number of Companies	Engine Companies: High Value Companies	Engine Companies: Men on Duty	Total Pumpers	Ladder Companies: Number of Companies	Ladder Companies: Men on Duty	Asst. Chiefs and Aides	Total Fire Fighters on Duty
Under 25	2	0	8	2	1	4	0	12
25	3	1	13	4	1	4	1	18
37.5	4	2	18	5	2	8	1	27
50	5	2	22	7	2	10	2	34
67	6	3	27	8	3	15	4	46
75	7	3	31	9	3	15	4	50
100	8	4	40	10	4	24	4	68

Manpower Assigned

Engine Companies	No. Men	Ladder Companies	No. Men
(Below 80,000 Population)		(Below 40,000 Population)	4
High value engine companies	5		
Other engine companies	4	(40,000 – 80,000 Population)	5
(Over 80,000 Population)		(Over 80,000 Population)	6
All engine companies	5		

for each 200 to 300 persons as desirable as this might be. As a result, many cities try to operate the recommended number of companies with a skeleton force on duty as previously mentioned. This, however, provides very poor protection against serious fires, particularly those involving a life hazard. Generally, one of the most vital components of the fire fighting team, the ladder truck, is the first to be deprived of effective manning. This is done despite the fact that the schedule correctly calls for stronger manning on ladder companies than on engine companies because of the large assortment of jobs these companies are expected to perform in well-run fire departments.

Instead of a response of two pumpers and a ladder truck with 16 or more men, many cities have only 6 or 7 men responding with this basic group.

Accordingly, it seemed desirable to set down some suggested minimum fire forces that would provide reasonably effective fire companies and which could be maintained reasonably by cities of various size requiring approximately the same manpower per 1,000 population.

In preparing these estimates it was determined that no fire company should be operated with less than four men at any time and that a response of three pieces of apparatus would provide at least a dozen men. This is the minimum deemed necessary to make an effective attack on the average dwelling fire which is beyond first-aid fire fighting and to provide an effective initial attack on other structural fires. Even in small cities the response would include a ladder company of not less than four men who are needed to open the structure, perform rescues, ventilate, handle ladders and perform general truck company work. Where long ladders are not needed, squad companies may provide this service.

In all cities at least the engine companies designated for high value districts should have five men on duty to provide extra manning for working fires, and at least in the cities of over 75,000 or 80,000 population this manning is desirable for all engine companies. Greater than five-man engine companies are not suggested as a minimum manning because experience has shown that five-man crews can be highly efficient either with one-piece or two-piece engine companies. We prefer to use available manpower to strengthen the ladder companies as much as possible.

It is recommended that, in cities of over 40,000 population, five men should be the least number on duty with ladder companies. It should be quite clear that there is more truck work and more frequent working fires in cities above this size and, in general, it is desirable to increase ladder company strength to this figure before adding more ladder companies. In larger cities a six-man minimum manning is highly desirable for ladder companies.

Table 6 shows a method for effectively manning fire companies. To accomplish this manning with an obtainable number of fire fighters per 1,000 population it is suggested that one or two less companies be manned under normal conditions than recommended in Table 2. The reason is that, in order to avoid 2- and 3-man companies, it is preferable to man regularly only the number of pieces that can be operated effectively. However, the total required apparatus for the community would be manned when needed by calling back sufficient off-duty men.

It is suggested that all the pumpers called for in Table 2 be operated under normal conditions by having at least half of the high value engine companies operate two pumpers. This is an excellent means to provide good heavy stream service and to utilize pumping capacity. On multiple alarms the off-duty men would provide sufficient manning equivalent to having each pumper as a separate company. Also, at times of major emergency, such as bad storms, the double companies would be divided and fully manned by the off-shift. Thus the same number of pumpers as called for in Table 2 are utilized but have one or two less engine companies on duty to avoid weak companies.

Table 7. Number of Fire Fighters Required for Suggested Effective Manning With Varying Nominal Work Weeks

Population (in Thousands)	Fire Fighters on Duty	Men on Duty per 1,000 Population	Number of Fire Fighters Needed to Provide On-Duty Force Shown, Under Various Work Weeks				
			42 Hours	48 Hours	56 Hours	64 Hours	72 Hours
Under 25	12*	–	54	47	40	35	31
25	18	0.72	80	70	60	53	47
37.5	27	0.72	120	105	90	79	70
50	34	0.68	151	132	113	100	88
67	46	0.69	204	179	153	134	119
75	50	0.67	222	194	166	146	130
100	68	0.68	302	264	227	198	176

*May include call men.

Likewise, in a few cases, Table 6 shows one less ladder company on duty in the smaller cities than called for in Table 2 in the belief that 4- or 5-man ladder companies are to be much preferred to 2-man ladder companies. Where additional trucks are called for in Table 2 these should be provided to be manned by off-duty personnel A great many cities are short in the number of ladder companies as well as in the manning of ladder companies.

normally having fully-paid fire departments. In other words, the strengths are compatible with the population protected. The larger cities protect more people with each fire company and the companies require somewhat stronger manning accordingly.

Table 9 shows the off-duty men available to make up shortages in the on-duty force. In general, except in very small cities, only a portion of the off-duty force would be needed to fully man all apparatus. Four

Table 8. Number of Fire Fighters Required per 1,000 Population to Provide On-Duty Manning Shown

Population (in Thousands)	Fire Fighters on Duty	Men on Duty per 1,000 Population	Number of Fire Fighters Needed per 1,000 Population to Provide On-Duty Force Shown, Under Various Work Weeks				
			42 Hours	48 Hours	56 Hours	64 Hours	72 Hours
Under 25	12	–	–	–	–	–	–
25	18	0.72	3.2	2.8	2.4	2.1	1.9
37.5	27	0.72	3.2	2.8	2.4	2.1	1.9
50	34	0.68	3.0	2.6	2.3	2.0	1.8
67	46	0.69	3.1	2.7	2.3	2.0	1.8
75	50	0.67	3.0	2.6	2.2	2.0	1.7
100	68	0.68	3.0	2.6	2.3	2.0	1.8

Table 7 shows the manpower required to give the suggested on-duty manpower under various work weeks. This will provide at all times the effective manning for all fire companies shown in Table 6. Thus, to have at least 18 fire fighters on duty with a 56-hour work week there should be 60 men assigned as indicated in Table 6.

Table 8 indicates that these company strengths are reasonable and obtainable in all population groups

off-duty men are calculated as being equivalent to a man on duty.

It is important that it be clearly understood which off-duty men are subject to be recalled. In very small departments all off-duty men may be needed for a general alarm fire or other major emergency. In larger departments, because the off-duty force is substantially greater than on-duty personnel, only a portion of the off-duty men may be needed at times of big fires

Table 9. Number of Men Off Duty Available for Manning Reserve Apparatus and Making Up Shortages in On-Duty Force

On-Duty Force	42 Hours	48 Hours	56 Hours	64 Hours	72 Hours
6	27	24	20	12	10
12	42	35	28	23	19
18	62	52	42	35	29
27	93	78	63	52	43
34	117	98	79	66	54
46	158	133	107	88	73
50	172	144	116	96	80
68	234	196	159	130	108

Table 10. Response Groups on Duty
(Based Upon 2 Engine Companies and 1 Ladder Company)

Population (in Thousands)	Number Response Groups on Duty	Number Men on Duty per Response Group
Under 25	1	12
25	1	14
37.5	2	16
50	2+	16
67	3	17
75	3	17
100	4	18

or other situations (such as severe storms) which require full manning of all apparatus. Where there are three or more groups or platoons the groups on stand-by basis may, perhaps, equal the force regularly on duty. For example, with a 48-hour week with 2 groups working and 5 off duty, 1 or 2 of the off-duty groups would normally provide an ample stand-by force except for major conflagrations. With a 56-hour week with 1 platoon working and 2 off duty, only 1 of the "off" platoon might be needed to provide manpower to handle all available equipment.

These suggestions on the number of companies on duty are based upon ability to handle a reasonable number of one-alarm building fires. The number of men normally responding with an average first-alarm response group and the number of such groups on duty is shown in Table 10. Manpower response is heavier in the larger cities which generally have more serious working fires. The study is not concerned with cities over 100,000 population where more fire companies generally respond in high value areas.

On the few cases when the majority of the on-duty men are to be tied up on a long job, enough off-duty men would be called back and paid overtime to man the required reserve apparatus.

As shown, a fire department in a city of 25,000 population would respond with two engine companies and a ladder company and an average of 14 men including the assistant chief on duty. One company of at least 4 men would be in quarters for another call. If we had attempted to man 4 pumpers and 2 ladder trucks with the same on-duty force we would average less than 3 men per company and only 9 men responding per fire in the 2 engine companies and ladder company.

A city of 50,000 population would be able to handle two building fires simultaneously and still have an on-duty company in quarters. A city of 75,000 population could handle three such fires and still have covering apparatus. (In many cases companies are available under mutual aid when extra covering companies are needed.)

The question may be raised as to whether the number of fire companies suggested in Table 6 will give adequate coverage and acceptable running distance. In the vast majority of cases the coverage will be excellent if the distribution of companies and stations has been made with a reasonable degree of intelligence. Of course, if companies are overlapping in some areas, other districts may be too far from the nearest apparatus. Where there is some remote area more than three miles from the nearest fire company a station may be required. If there is very little assessed valuation a volunteer company with perhaps one paid driver or custodian may be adequate. Where the values warrant a paid company, frequently it is possible to locate one of the required companies in the area without seriously reducing protection to the balance of the city. For example, in one city an engine was relocated where it would not only protect an isolated outlying area, but would be within reasonable running distance of the heart of the city when the downtown companies are out.

Another advantage of the suggested plan for manning is that, in stations housing two or more companies, it is possible to send out a single piece manned by a detail for small outside fires or emergency calls and still maintain a basic response unit of at least 12 men for building fires. In other words, one pumper of a two-piece engine company responds with two or three men (possibly including a man detailed from the ladder company) and yet the basic number of companies is available.

Table 11 compares the manpower requirements for full on-duty manning of all recommended companies and the suggested manning called for in Table 6 with a 56-hour work week. This shows that in the smaller cities reasonably good protection can be provided with half the number of men on duty that would be required for full manning. However, in the larger cities there is less difference between the full manning and the number judged to provide an effective force on duty.

Table 11. Manpower per 1,000 Population, 56-Hour Nominal Work Week

	Full Manning (Table 2)			Suggested Manning (Table 6)		
Population (in Thousands)	Number of Fire Fighters on Duty	Total Number of Fire Fighters	Number of Fire Fighters per 1,000 Population	Number Fire. Fighters on Duty	Total Number of Fire Fighters	Number of Fire Fighters per 1,000 Population
25	36	120	4.8	18	60	2.4
37.5	41	137	3.7	27	90	2.4
50	60	200	4.0	34	113	2.3
67	67	223	3.3	46	153	2.3
75	74	246	3.3	50	166	2.2
100	86	287	2.9	68	227	2.3

NEW FIRE BOAT FOR PORTLAND

The "City of Portland" shortly after launching in East Boston, Massachusetts. Open door amidship leads to galley and sleeping quarters behind wheel house. (*All photos by Portland Fire Department.*)

IN APRIL, Chief Carl P. Johnson's fire department in Portland, Maine, received a new 7,000 gpm fire boat. Built for slightly less than $250,000, this new "City of Portland" will protect the docks, shipping facilities and harbor area of the 85,000 seaport city. It replaces the old "City of Portland" which went into service in 1931 and was operated by a five-man crew.

Because of the shallow harbor, the new vessel has a draft of only 6 feet. It is 64-ft., 11-in. long and has a beam of 18-ft., 6-in. Main propulsion is supplied by two Cummins 600 hp diesel engines with two Cummins 115 hp diesels serving as auxiliary engines. For fire fighting action, there are two DeLaval pumps rated at 3,500 gpm at 150 psi.

Electric power is supplied by two Onan generators, one 15 kw and the other 3 kw, both supplying 115 volt alternating current.

Fire fighting equipment includes four "Invincible" monitor nozzles, one of 3,000 gpm capacity, two of 1,500 gpm capacity, and a remote-controlled tower monitor of 1,500 gpm capacity. There are also ten 2½-in. hose discharge outlets for hand lines. Carbon dioxide can be discharged through 150-ft. of hose from a bank of eight cylinders containing 400 pounds of CO_2.

The foam system was installed by Rockwood Sprinkler Corporation of Worcester, Massachusetts.

It features automatic control of foam liquid injection, variable percentage selection, selection of foam or water discharge, and nozzles that deliver foam, fog foam, water fog or straight stream. Foam liquid proportioning is accomplished by a balanced pressure proportioning system utilizing a centrifugal injection pump, a pressure control valve, two ratio flow controllers, a proportioning controller and a percentage selection metering valve. The foam liquid pump is driven by power take-off from one of the main diesel engines.

A Rockwood FFF turret nozzle designed for attachment to the aft monitor can deliver 5,000 gpm of expanded foam (500 gpm of solution). Two 2½-in. nozzles can be attached to aft outlets and are equipped with 2½-in. ratio flow controllers for delivering 1,600 gpm of expanded foam (200 gpm solution rate).

The "City of Portland" was designed by John G. Alden and Company, Inc., naval architects of Boston, Massachusetts, built by General Ship and Engine Works, Inc., of East Boston, with the hull constructed by Gladding-Hearn Shipbuilding Corporation, Somerset, Massachusetts.

All pumping and propulsion machinery in the "City of Portland" can be operated by one man in the wheel house through remote control. Normal operations will be handled by a three-man crew but living quarters for four are provided. Interior quarters include a galley, deck lounge (also used as a rescue room with space for two stretchers and first-aid equipment), and the wheel house. The fire boat can move at 15 mph, turn in her own length in seven seconds and make a crash stop from full-ahead to dead-stop in 12 seconds. Auxiliary engines can provide a speed of 8.3 mph with full maneuvering potential. The vessel can operate at pumping capacity while traveling at full speed.

Fog foam can be discharged from this nozzle on the afterdeck.

Discharge of foam from one of the hand lines on the "City of Portland."

TRAINING CENTER FOR POWER UTILITY EMPLOYEES

A report from Walter F. Schonhart, Supervisor of Fire Training, Niagara Mohawk Power Corporation and formerly Drill Instructor of the Buffalo, New York, Fire Department.

THE Niagara Mohawk Power Corporation supplies gas to 17 counties and electricity to 36 counties in upstate New York, from Buffalo to Albany. The Company has long recognized the need for an employee fire training program but, because of the broad expanse of its properties, considered it impossible to bring all employees to a centralized fire school. The solution was found with the formation of a fire training organization within the Company, consisting of one fire instructor from each operating area plus one instructor from each Steam Generating Station.

Under the direction of John R. Corcoran, System Fire Protection Engineer, employees, for the most part from supervisory positions, were appointed who would receive training at a central school and would return to their respective areas and conduct fire fighting training for other employees.

Locating the school was a problem because of the objections to smoke, but a suitable site was found in the City of Oswego which overcame these objections. In addition, Oswego is centrally located in the power corporation's extensive system.

In laying out the school, emphasis placed was on "realism." Two pits were installed but these serve principally to give trainees the "feel" of a fog nozzle or dry chemical extinguishers. Pit fires are spectacular,

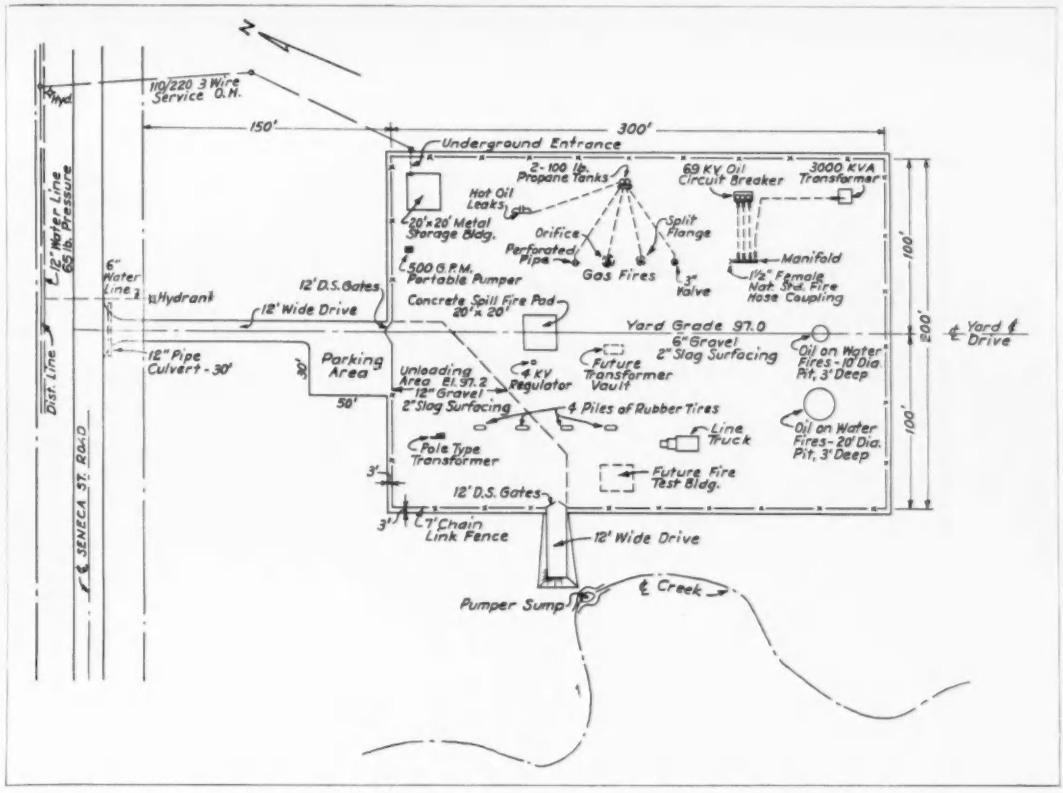
Dry chemical extinguisher is used on this gasoline fire in electric utility line truck.

but utility employees need particular training for fires involving oil-filled electrical equipment such as transformers, circuit breakers and voltage regulators. Consequently, scrap pieces of electrical equipment were installed at the Oswego training center and piped so that they would overflow and reproduce realistically the ground, side and top fires that result from faults in such equipment.

The realism theme was carried over into nozzle pressures also. Major stations of the Company are equipped with yard hydrants and 1½-in. hose lines with the adjustable type fog nozzles. However, since hydrant pressures on many properties are in the 50 psi range, that pressure is used at the school to prove to those responsible for training employees that one man with reasonable practice can easily extinguish transil oil fires in large pieces of electrical equipment. To reproduce the higher nozzle pressures in those properties (such as steam stations) where fire pumps are installed, a 500 gpm trailer-mounted pump is used to supply the hose lines.

A 3,000 KVA transformer was installed and piped so that water is pumped into the bottom forcing the burning transformer oil to overflow the top. This creates the ground, side and top fires typical of faults in this type of equipment, plus the fire behind the cooling radiators that can present a problem. This unit is 12 feet high. It is given a generous pre-burn so that all parts are thoroughly heated. This reproduces the condition encountered when a traveling operator responds to a trouble alarm at an unattended station. Three 50 foot lengths of 1½-in. hose are laid in, the hydrant is opened and the fire is extinguished, all by one man as the others look on. No "tricks" are used, no special fuels, no high-pressure fog and the man gets no help from the other trainees. The same hose, nozzle and hydrant, the same piece of equipment, the same fuel, the same delay in responding, the same low hydrant

Trainees use 10-foot applicator to extinguish burning transil oil inside transformer after side and ground fires have been knocked down.



Layout of Niagara Mohawk Power Corporation Training Center at Oswego showing fire test installations, water supply and other features. Fire test building is now under construction.

pressure and the same one-man operation — all these create the typical situation that an operator would meet "in the field." After the outside fire has been extinguished and the unit cooled down, an applicator is used to extinguish fire inside the transformer. In some cases, this fire cannot be extinguished, which stresses the importance of always calling the local fire department.

A three-cell, 69 KV oil circuit breaker is ignited and handled in the same manner. In addition to hose lines, 150 pound wheeled dry chemical extinguishers are used on this unit, here, too, as a completely one-man operation.

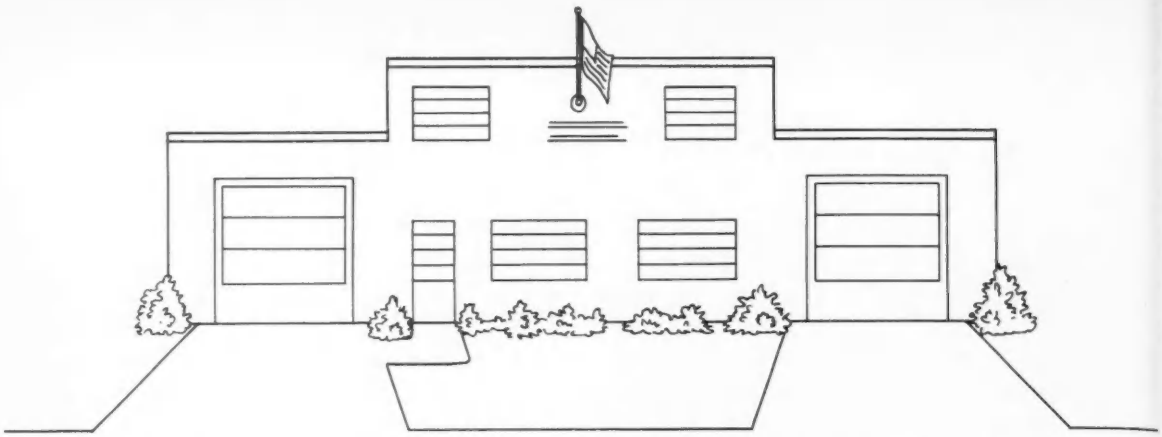
Then a 4 KV oil-filled voltage regulator is ignited. For this, portable dry chemical or carbon dioxide extinguishers are used. This unit is also allowed to burn for a period of time, usually a half hour, so that all parts are as hot as they would be with the usual delayed response to an unattended station. This illustrates the danger of reflash or reignition that invariably occurs.

A pole-top transformer is ignited and allowed to burn for a time. Depending on the wind, the wood pole and crossarm may or may not ignite. As with all fires, several methods of extinguishment are practiced. Hose lines from the ground will extinguish the wood fire but not the oil fire inside the transformer. Here, utility-type bucket or ladder trucks are used with portable extinguishers of various types. Linemen climbing and using portable extinguishers also work on this fire.

(Continued on page 28)

A 1½-in. line with low pressure nozzle is used on this 69 kv oil circuit breaker to show potential of equipment in stations where only hydrant pressure is available.

A 3,000 kva oil-filled transformer is concealed in the smoke and flames. Trainee is attacking fire with 1½-in. line with adjustable fog nozzle. Note this is a one-man operation since man behind nozzle man is instructor and is not assisting.

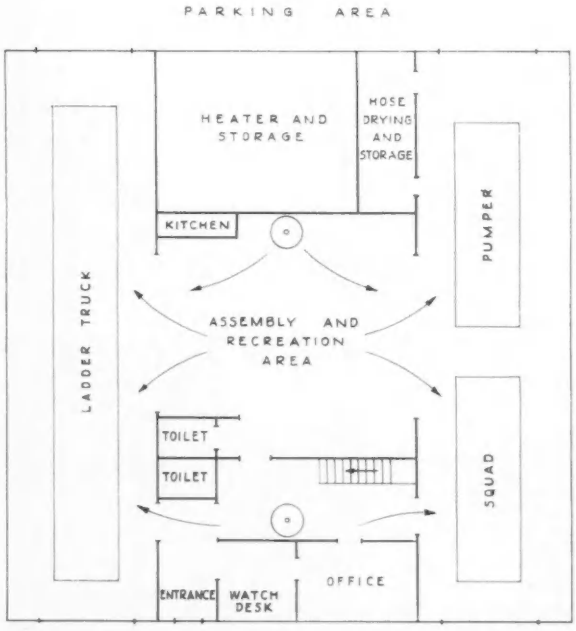


Sketch of front view of suggested fire station. Exterior design and landscaping would be modified to be compatible with architecture of surrounding neighborhood. Small door in left front leads to watch desk.

A NEW APPROACH TO

FIRE STATION DESIGN

FOR many years fire stations have been designed around the apparatus room. The layout of these structures as bases for fire company operations and accommodation of personnel has been somewhat an afterthought. Years ago men were quartered over the stables and apparatus floor. Later, living quarters were tacked on the side of a "bungalow" type structure. This latter plan may be satisfactory for small suburban stations and where plenty of land is available, but wastes space where land values are high.



Sketch of ground floor showing primary traffic flow of personnel when an alarm comes in.

There is an increasing awareness of the fact that fire stations should be designed for the convenience of the men who use them. Accordingly, we present a new arrangement in which there is a central building as a base of company operations. Apparatus rooms, provided as needed in wings at the sides of the main building, can be made any size required, but of a lighter and less costly construction than where living quarters are provided overhead. One of the important features of this fire station design is the simplified "traffic flow." Men can move quickly to their assigned apparatus without having to run around or between trucks. Apparatus is equidistant from service and hose storage areas as well as from living and recreation areas.

The company quarters is a two-story section, with ceilings of nominal height for efficient operations. This structure may be air-conditioned. The first floor has a front entrance, a watchroom which looks out toward the street, and a front office for company officers and records. There is a public toilet so that strangers will not have to pass the entrance hall or use the fire fighters' facilities. There is a main stairway to the living quarters above and direct access from the watchroom and office area to the apparatus rooms. Behind the front section is a large company assembly and recreation area out of sight of the public and opening directly into the apparatus rooms on each side. Kitchen facilities are located in this area.

(*Continued on page 22*)

The speedy and efficient manner in which the fire in our plant was detected and extinguished left nothing to be desired.

W. D. Ford
Purchasing Agent

ARTISAN METAL WORKS COMPANY

Cleveland, Ohio

.... protects its property

Automatically — gets better

FIRE and **BURGLARY** protection

saves $2,500 a year

Mr. Ford's statement reproduced above refers to a fire which started on a workbench at 5:46 p.m. on January 22. Instantly detected and reported to the fire department by ADT Aero Automatic Fire Alarm Service, the blaze was promptly extinguished by Cleveland fire fighters.

One of the country's leading sheet-metal fabricators, Artisan Metal Works Company must maintain steady production to supply its customers with specially built cabinets for electronic and mechanical equipment. And to guard against interruption by fire and other hazardous conditions, the company's 60,000 square feet of factory space is protected *automatically* by ADT.

Aero Automatic Fire Alarm Service stands constant guard to warn of fire and summon fire-fighting forces. ADT Burglar Alarm Service detects unauthorized entry and automatically summons police. ADT Heating Supervisory Service automatically detects and reports dangerous variations in temperature. In all cases, ADT provides regular inspections, tests and complete maintenance of its equipment.

Company officials report that this superior protection saves $2,500 a year over the cost of hourly patrols.

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An ADT specialist will show you how the right combination of *automatic* services can save you money and give better protection for property, profits and employees' jobs. Call our local sales office if we are listed in your phone book, or write to our Executive Office.

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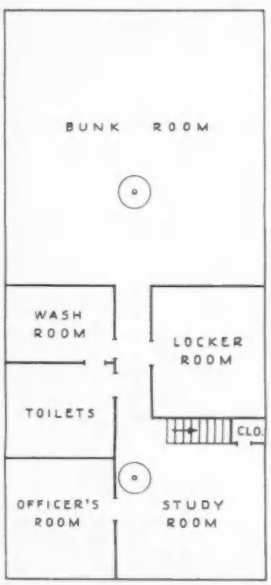
A NATIONWIDE ORGANIZATION

A New Approach to Fire Station Design

(Continued from page 20)

Windows, all along the top of the apparatus rooms on both sides, provide considerable light which is supplemented by modern indirect lighting. Behind the assembly area is the service area including heating equipment, storage rooms and hose storage and drying equipment. An exterior hose tower can be provided at the rear if desired. Elimination of the basement reduces costs but there can be a small basement heater room.

The living quarters are all on the second floor providing privacy and quiet. The main stairway is adjacent to the locker room and washrooms, and is at one side of a large study room in which company classes can be held or men can read remote from the recreation area and sleeping quarters. At the front



(Left) Sketch of living quarters in suggested fire station. Poles would provide a short drop to ground floor. Ample windows are suggested for all sides. Dimensions for entire station can be modified to suit local needs.

also is a sleeping room for the officers. Note that washroom and toilet facilities are separated which, unfortunately, is not done in many firehouses. The plumbing facilities on the first and second floors are grouped to reduce construction costs and the toilets are so located that separate facilities for the officers are not required.

Sliding poles are provided both at front and rear of the quarters as required. Normally, the front pole would be used by the officers and those in the study room and leads to the watchroom and office area and front of the apparatus. Poles in the bunk room lead to the recreation area and rear of the apparatus. The poles are of the self-closing type with protective rails. The danger of the old-fashioned pole is largely eliminated because the drop is reduced to not over 10 feet, since the poles do not stand in a high-ceiling apparatus room. The living quarters are light and airy with windows on all sides.

No dimensions are shown on the plans because each station should be designed to fit local requirements. The sketches indicate quarters for men and officers needed to man a two-piece engine company and a senior aerial ladder, but both the living quarters and apparatus rooms can be expanded as needed without a major modification of the layout. One advantage is that each company has its own apparatus room. Each apparatus room can easily be made wide enough to house two trucks abreast. The plan can readily be modified to house a chief officer if desired. In fact, if a service type aerial is used or a single piece engine company is quartered in the structure, the basic plan allows room for a chief's car. While the type of building shown can be fitted to a lot width as narrow as 70 feet, a larger structure may be desirable and the architect will fit the structure to the local requirements and provide the architectural style compatible with the neighborhood.

Floodlights on Apparatus

THE fire department in Washington, D. C. recently has been installing 500 watt floodlights on the windshield of apparatus. These lights operate off the alternator and are controlled by a switch so that floodlighting is available instantly without the need for starting up auxiliary generators when apparatus reaches the fire ground.

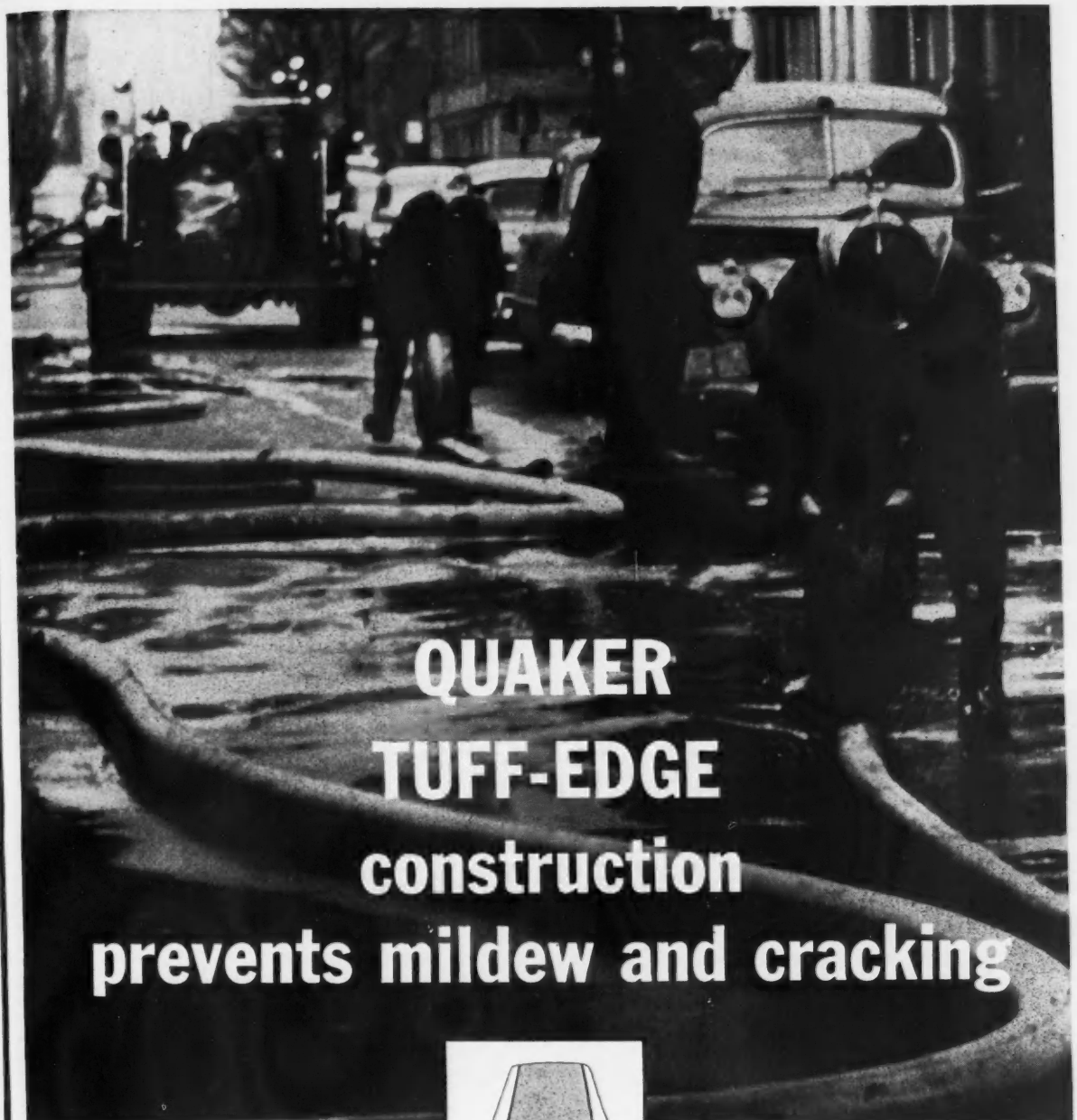
While prompt and adequate lighting is desirable, all fire departments should be careful about the use of powerful lights on apparatus. In one state recently, volunteer fire fighters were using spotlights indiscriminately while traveling to and from the scene of a fire alarm. While their intentions apparently were to clear traffic with the powerful spotlight, this questionable use of lighting equipment was extremely hazardous to other drivers. The glare of a 500 or 1,000 watt spotlight into oncoming traffic can be blinding and, in this particular state, the safety director ruled that such spotlights were illegal.

While the legal difficulties were eventually straightened out, nevertheless, the incident should be significant to all fire departments.

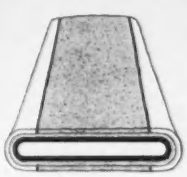
Aerial ladder truck of the Washington, D. C. Fire Department showing floodlights mounted on the windshield.

Changing Address?

SUBSCRIBERS to FIREMEN magazine who plan to change address should notify the NFPA Executive Office promptly so they won't miss any issues of the magazine. Fire fighters who receive the magazine through fire chiefs' or fire departments' membership should also include this information when they send notification of their new addresses.



QUAKER TUFF-EDGE construction prevents mildew and cracking



Edge reinforcement of synthetic fiber takes repeated folding without cracking, dries fast, reduces weight by 15%, saves storage space.

...Hose lasts at least five times longer, too. The exclusive "Dacron" edge of TUFF-EDGE* hose doesn't absorb moisture—can't mildew in the folds even if it's soaked with water. Cracks can't develop in the frequently-flexed edges. In fact, small and large fire companies that have used TUFF-EDGE report that it lasts five or more times longer than conventional types of cotton-jacket hose.

TUFF-EDGE tests at 600 lbs., is available in 50-foot lengths, in 1½" and 2" diameters. Standard couplings. For complete information, ask your Thermoid distributor or write *Thermoid Division, H. K. Porter Company, Inc., Tacony & Comly Sts., Philadelphia 24, Pa.*

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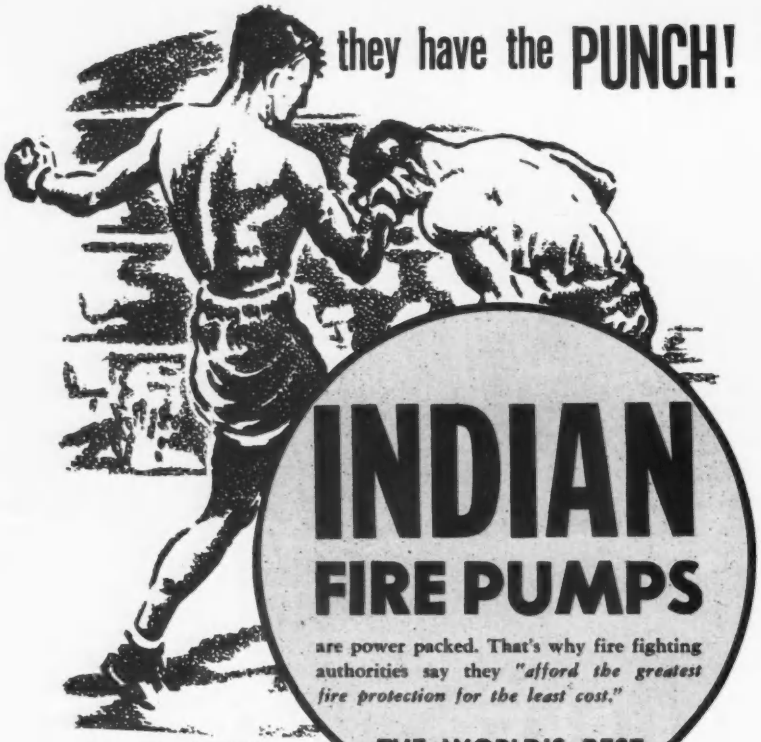
PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION; Copper and Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION; and in Canada, Refractories, "Disston" Tools, "Federal" Wires and Cables, "Nepcoduct" Systems—H. K. PORTER COMPANY (CANADA) LTD. *PATENT #2,833,313



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are power packed. That's why fire fighting authorities say they *"afford the greatest fire protection for the least cost."*

THE WORLD'S BEST

No. 90 INDIAN
(Sliding Pump Type)

Today everyone demands the most for his dollar. **VALUE** and **LONG LIFE** come first. That's why so many insist on **INDIAN FIRE PUMPS** — they do a better job and last longer. Inexpensive spare parts are always available in a hurry. Put more smash into your fire fighting drive — make **INDIANS** your first line of defense.

No. 80 INDIAN
(Lever Type Pump & Handle)

Fire fighting authorities who have experimented with a "WET WATER" powder mixed with the water in an **INDIAN FIRE PUMP** tank report it does an excellent job.

Both Types Approved by Underwriters' Laboratories, Inc.

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CANADIAN AGENTS

Fleck Bros. Limited, Vancouver, B.C.
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"No lost motion in our volunteer fire department!"

"Sound the Alarm!"

AN ATTRACTIVE folder with the above title was recently published by the Bureau of Instruction and Training of the Milwaukee, Wisconsin, Fire Department, in cooperation with the Junior Chamber of Commerce. It presents basic instructions for the general public on how to use a fire alarm box or the telephone when reporting fire emergencies. The fire department telephone number is included together with general instructions on how to call the operator if the fire department number is forgotten.

The department will have 75,000 copies of these for distribution in Milwaukee. Battalion Chief Edward B. McCabe is Public Relations Officer of the department.

SPARKY TIE CLIP

A REAL EYE-CATCHER!

1 inch high SPARKY gleams in red, blue and black enamel on bright chromed metal with spring clip.

$2.00 plus 10 cents for shipping

Free list of other SPARKY products
— Write today to —

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ROCKWOOD
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$15.00 worth of FOAM liquid
3 Gallons Rockwood Foam Liquid
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Gives you 1000 gallons of extinguishing agent at 1½ cents a gallon
= Fast, Low-Cost Fire Extinguishing Agent

Rockwood Double Strength FOAM liquid binds large volumes of air and water into the fastest, most effective, lowest cost extinguishing agent for fighting any type of fire.

Besides helping you save lives and property, it can save you hundreds, even thousands of dollars in the cost of fire-fighting material. Using other types of fire extinguishing agents, you pay 100% for the agent, plus storage and shipping. *Rockwood FOAM liquid costs only 3 tenths of 1% — shipping costs are less — storage costs are greatly reduced!*

Also, the very small proportion of Rockwood FOAM required enables you to use the extinguishing agent — actual, not simulated — for efficient departmental training, at negligible cost. Tested and listed by Underwriters' Laboratories, Inc. Send coupon for complete information.

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Engineers Water . . . to Cut Fire Losses

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Please send me your illustrated booklet on Rockwood fire-fighting products.

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A CHANGE IN

ST. PETERSBURG BEACH

CONSOLIDATION of three separate fire departments into one unit has proved successful in St. Petersburg Beach, Florida.

Prior to their merger, the St. Petersburg Beach, Pass-A-Grille and Don Vista Fire Departments all protected the island of Long Key, located off the west coast of Florida. In July, 1957, the three departments united under the St. Petersburg Beach Fire Department, with a combined force of eight full time paid men and 55 volunteers, to become the largest fire fighting unit on the Florida Keys.

Under the leadership of Chief Victor J. Higgins, the department operates six pieces of apparatus in three stations and is planning to purchase a 750 gpm pumper this summer. The South Station, formerly Pass-A-Grille, has two 500 gpm pumpers and is manned by three paid men and twenty volunteers. The North Station, which was St. Petersburg Beach, operates a 500 gpm pumper, a 1,200 gallon tank truck, and is manned by three paid men and twenty-five volunteers. Here also is the headquarters of the chief. Together with the Don Vista station, the three stations protect a resort and residential community of about 10,000 permanent residents and cover an area of more than 15 square miles.

Members and apparatus of the St. Petersburg Beach Fire Department.

The St. Petersburg Beach fire fighters train at the Florida State Fire College in Ocala but still attend weekly training sessions at their respective stations. The department's volunteers recently purchased their own camera, projector and tape recorder so they could film and narrate their various training activities and file them for future re-showing.

The city of St. Petersburg Beach is improving its water distribution system by installing larger water

Better Hose Care-with CIRCUL-AIR
HOSE CONDITIONING EQUIPMENT
WASHERS • DRYERS • TURN-TABLES • STORAGE RACKS

ROTO-JET HOSE WASHER
AUTOMATICALLY
WASHES—RINSES—DRAINS HOSE

ROTO-JET Washes, Rinses, Drains hose thoroughly and quickly. Hose is self-propelled. Simple one-man operation. With or without detergents, ashes, glass and sludge are automatically scrubbed out and flushed away. Lengthens hose life. Foot-Pedal Operation.

FIRE HOSE DRYER

The patented, electrically operated Circul-Air hose dryer circulates pre-warmed fresh air through loosely coiled hose at the rate of 5 to 6 air changes per minute. No other drying method is so fast — so economical — so easy to use. The preferred dryer in over 5,000 leading Fire Departments.

ACCEPTED - APPROVED
RECOMMENDED

Approved by Underwriters' Laboratories . . . and Canadian Standards Association. Recommended by all leading fire hose manufacturers.

The fast, modern way to handle, store and load hose.

PORTO-RAK
MOBILE
HOSE STORAGE
AND
LOADING UNIT

Saves valuable space. Holds 1,800 ft. of 2½" hose—proportionately more of 1½"—in an 8 ft. space (when loading table is detached). Roll it right up to the truck for reloading—out of the way when not in use. Equipped with locking fiber-wheeled casters.

WRITE FOR NEW LITERATURE

If you are planning to build or remodel, send for our brochure "Fire Station Design."

THE CIRCUL-AIR CORPORATION
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mains and new hydrants. The entire island recently earned a Class 7 rating by the South-Eastern Underwriters' Association.

In addition to providing fire protection, the department has a fire prevention bureau, a beach patrol and rescue squad. Active in civic activities, it sponsors a junior firemen's corps, little league, boy scouts and maintains a blood bank available to anyone in the community.

Philadelphia's Communications Car

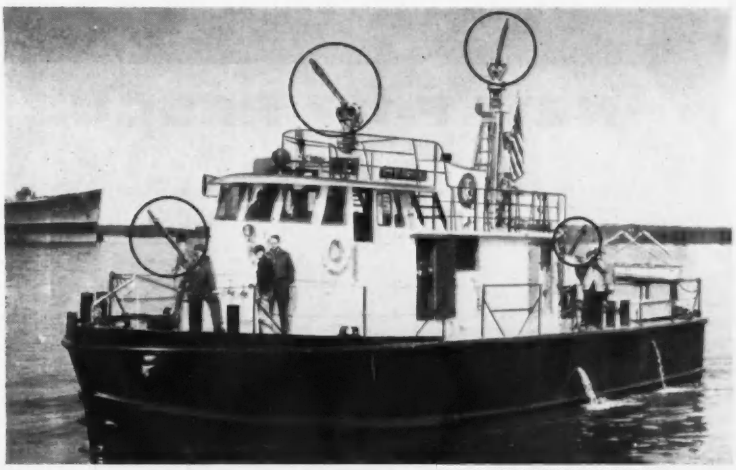
AS MENTIONED in last month's issue of FIREMEN magazine, Philadelphia's mobile communications apparatus recently played a significant role in the two 15-alarm fires in that city.

Its new, mobile unit, larger than the previous van-type vehicle, is housed in a trailer towed by a flat-bottomed truck. Built by the Philadelphia Division of Automotive Services, the trailer is 8-ft. wide by 23-ft. long. About two-thirds of the body contains two-way

radios for the fire, police, and other city departments' communications. Also included is a public address system used to help control crowds and give orders to police and fire fighters at the emergency scene. The other third of the trailer is for operating and staff personnel only and has built-in seats and desk space to be used by officers of the city's various departments when joint decisions must be made in emergency situations. As reported in the May, 1956, issue of FIREMEN magazine, Philadelphia's mobile unit provides on-the-scene communications as part of the city's practical disaster plan.

Mounted on the truck is a gasoline generator that supplies power for the communications trailer and for emergency floodlighting. Two large cabinets on each side of the truck hold miscellaneous equipment and tools including floodlights, portable stands for the lights and public address systems.

NEW "City of Portland" FIREBOAT



CHOOSES "INVINCIBLE" MONITOR NOZZLES

"WE AGAIN CHOSE 'INVINCIBLE' MONITOR NOZZLES MADE BY McINTIRE BRASS WORKS FOR OUR NEW FIREBOAT BECAUSE OF THEIR PROVEN RUGGEDNESS, PERFORMANCE AND ABILITY TO DELIVER LARGE AMOUNTS OF WATER WHEN AND WHERE WE NEED IT" — says Chief Carl P. Johnson, Portland, Maine.

— *Be Sure You Specify "McIntire"* —

F. N. McINTIRE BRASS WORKS, INC. 377 PUTNAM AVENUE CAMBRIDGE 39, MASS.

Training Center for Power Utility Employees

(*Continued from page 19*)

Since the distribution and sale of natural gas comprises a large portion of Niagara Mohawk's business, training on various natural gas fires is also conducted. Several types of gas leak fires are produced at various pressures and flows, such as occur in a leaking valve, split flange, broken stub-end pipe, or an underground leak burning on top of the ground. Dry chemical is the principal agent employed here. Although the average employee is admonished not to extinguish a gas fire but to seek means to shut it off, specially trained crews sometimes have to put out such fires and work on "live" leaks using protective clothing and protective breathing apparatus.

The serious potential of pressure-fed oil leaks on very hot steam pipes in steam generating stations is illustrated with a training prop. A six-inch pipe is heated with propane gas to the characteristic 1,000 degrees F. to represent the steam line. Turbine oil is pumped under pressure and allowed to strike this hot pipe. It ignites immediately and is readily extinguished, usually with dry chemical. However, the pipe, still being hot, reignites the leaking oil, illustrating the difficulty encountered in such a fire. This fire cannot be controlled unless the flow of oil is stopped or until the steam line is cooled with water fog to below the ignition temperature of the oil.

A utility line truck is used to demonstrate fires encountered in vehicles, particularly under the hood.

Since numerous masks of various types are in service on Niagara Mohawk properties, a complete course of instruction is given in protective breathing apparatus. A fire test building and an underground vault are being constructed to provide realistic conditions of interior and underground fires.

Area fire instructors are provided with a Fire Training Manual which outlines exactly what is to be taught to employees and how. Lesson plans are provided for the classroom type instruction together with 2- by 2-in. color slides. The NBFU film "The First Five Minutes" is also used. As an aid to instructors in conducting the outside practical work on fires, small portable lesson plans, or field notes are provided in a 4- by 6-in. plastic envelope, which can be carried in the pocket.

Each instructor who takes the course must perform each evolution. Everyone takes his turn on each fire regardless of his relative position in the Company. The theory is that no instructor should teach employees how to handle any kind of fire he has not handled himself.

The objective of the whole program is not to make professional fire fighters out of the 10,000 Niagara Mohawk employees, but rather to develop a group of employees who will react intelligently in an emergency situation, who will not be reluctant to tackle a reasonable fire with the equipment at hand, who realize the importance of calling the local fire department and who will be able to advise fire fighters intelligently when they do respond.

More for your Money...in MORYSVILLE

NEW F-117 RESCUE BODY

- Heavy duty construction.
- Diamond plate decks.
- Double paneled doors with full-length rod type hinges.
- All hardware chrome plated.
- Two ladder rack compartments.
- 84" CA. Available up to 114" CA.
- Stretcher case racks in body.
- Full length seats in body.

Custom built to carry high pressure water pump, generator, suction hose, Indian tanks, four resuscitators, six extra D tanks, etc.

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DISTRIBUTORS IN PRINCIPAL CITIES

Also a complete line of compact and versatile Fire, Fire-Crash, Rescue and Emergency Units and Special Built Fire Bodies. Finest materials and workmanship, extra-rugged construction and original modern design. Compartments arranged for handy stowage of fire fighting, first aid and life saving equipment, helmets, rain gear, tools, tanks, portable pumps and generators, etc.

Write for FREE Literature

What Are Your Answers to These?

THE Union Oil Company of California in Los Angeles recently conducted an interesting school for fire insurance inspectors and engineers of the Company. This was a two-day school with the first day devoted to demonstrations and the second day covering "field work" on fires outdoors. Also included was a three-hour night session with an interesting examination. This was written to provoke thought and discussion and, because of the variables which could result in different answers, **the questions and answers are not the sort which can be used in fire department promotional examinations.** On the whole, though, the quiz should stimulate plenty of discussion and research by fire department personnel.

Readers of FIREMEN magazine are invited to try their luck on the following questions used in the examination. The answers to this quiz, as given by the Company, will be found on pages 36 and 37.

Primary Fire Protection

A. FLASH POINT

1. The flash point test measures absolutely the potential fire hazard of a flammable liquid. True.....False.....

2. Open cup flash points are (higher) (lower) than closed cup flash points.

3. The break-point in the use of the Tag and Pensky-Martens flash point testers is (162° F.) (150°) (175°) (212°).

4. Flash point tests give absolute values. That is, if the same method is used every time, identical results will always be obtained. True.....False.....

5. In the following equation, what are "F" and "B"?

$$F = 0.72B - 122$$

F = ...

B = ...

6. Gasoline is added in the proportion of 2% to kerosene. The flash point of the mixture will be (*higher than*) (*identical to*) (*lower than*) the flash point calculated from the flash points of the components. Underline the correct answer.

7. Is it proper to use the term "kindling temperature" in connection with diesel fuel? Yes.....No.....

B. FLAMMABLE LIMITS

1. Following are three definitions and the terms they define. Mark after the terms the letters corresponding to their respective definitions.

a. The richest mixture of a flammable vapor in air that can be ignited.

b. The leanest mixture of a flammable vapor in air that can be ignited.

c. The range between the upper and lower flammable limits.

Flammable range.....

Lower flammable limit.....

Upper flammable limit.....

2. Following are four sets of upper and lower flammable limits and the names of the substances to which they relate. Mark after the names of the substances the

(*Continued on next page*)

ELIMINATE WATER AND SMOKE DAMAGE WITH Fulton COTTON MILLS SHUREDRY® GREEN-BAK SALVAGE COVERS

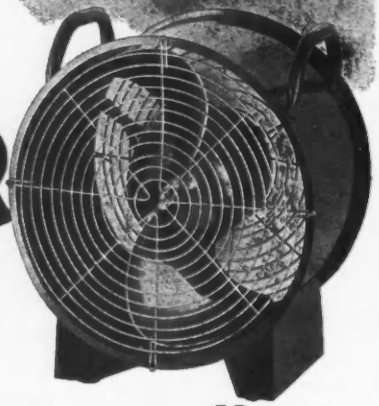
Shuredry is the *only* canvas cover with waterproofed seams . . . the *only* canvas cover which features the exclusive Fulton water-repellent finish, applied by pressure impregnation. Also mildew-resistant, Shuredry is sewn only with rot-resistant thread. ■ Meets specifications of National Board of Fire Underwriters. Approved by Associated Factory Mutual Fire Insurance Companies. ■ COMPETITIVELY PRICED. Get the best! Order today for fast delivery! Fulton Nylon Salvage Covers also available!

Write, call or TWX today! / **FULTON Cotton Mills**, P. O. Box 1726, Atlanta 1, Ga. / Phone: MUrray 8-1111 / TWX: AT 24

Get smoke out, get air in

with Multi-Purpose

SUPER VAC



CONTROLLED VENTILATION UNITS

NOT JUST A FAN ... but a powerful vacuum-action air screw ... Super Vac is amazingly simple in operation, made possible by the efficient design of the **powerful propeller** that is the heart of the unit. This patented propeller produces 100% pulling or blowing power over its entire surface.

Proved method of saving lives while also reducing smoke damage

Fire departments **nation-wide** attest to the speed with which Super Vac provides **controlled ventilation** ... so necessary in modern fire fighting. This multi-purpose unit primarily (1) gets rid of smoke and fumes through its powerful vacuum action ... or, (2) furnishes a tremendous blast of fresh air into the smoke-congested area, reducing the dangers of combustion and asphyxiation. Although one unit is often sufficient, **complete controlled ventilation** can be more speedily accomplished by using two or more units ... one or more units **pulling out the smoke and fumes** while the remaining units **blow in a steady supply of fresh air.**

★ **Highly portable ... operates in any position**
★ **Design permits vertical stacking**
★ **Made in 16" and 24" sizes**
★ **AC or DC, regular or explosion-proof motors**
★ **Choice of red or white baked enamel finish**
★ **Running board mounts available**

For complete details and specifications on

... contact your fire equipment dealer

... or write manufacturer

SUPER VACUUM

SUPER VACUUM MANUFACTURING CO., Inc
319½ East Seventeenth Ave., Denver 3, Colorado

(*Continued from page 29*)

letters corresponding to their respective ranges.

a.	14.0 — 5.3	gasoline.....
b.	5.0 — 0.7	methane.....
c.	8.5 — 1.9	diesel fuel.....
d.	7.6 — 1.4	butane.....

C. Ignition Temperature

1. The ignition temperature of any substance will vary with the conditions of test. True.....False.....

2. Within a given series of substances (e.g., petroleum hydrocarbons) the ignition temperature (*increases*) (*decreases*) with increasing boiling points. Underline answer.

3. The ignition temperature of any substance is (*higher*) (*lower*) than its flash point. Underline answer.

4. Butane and heavy gas oil vapors, both at 1000° F., escape at the same fairly high rate from identical openings pointed downward from an elevation of 15-ft. above ground. Write in the answers to the following questions.

a. Which is more likely to ignite at the point of escape?.....
b. Assume a source of ignition several feet above the point of escape and that neither the butane nor the heavy gas oil vapors ignites at the point of escape. Which is more likely to be ignited?.....
c. Assume a source of ignition a considerable distance downwind of the point of escape. Which is more likely to be ignited?.....

D. Classification of Fires

1. After each of the following, mark A, B or C, depending on whether, if the material or equipment is involved in a fire, the fire is Class "A," "B" or "C."

a. Sulfur dust.....
b. Molten sulfur.....
c. Dumpster containing metal.....
d. Dumpster containing oily rags.....
e. Mercaptans.....
f. Hydrogen sulfide.....
g. Wood flour.....
h. Wooden scaffold.....
i. A power pole. You do not know whether the line is "hot".....
j. A power pole. You know the lines are "hot".....
k. A power pole. You know the lines are not "hot".....
l. A power pole. Gasoline is spraying over the pole from a broken line and you do not know the condition of the power lines.....

m. Deep-fry kettle in cafeteria kitchen .....

n. Pastry mixer in cafeteria kitchen .....

o. Coke pile.....

p. Conference room.....

q. Crude oil in tanks.....

r. Refined oil in tanks.....

2. After each of the following Class "B" fires write "2" or "3" depending upon whether it is a 2-dimensional or 3-dimensional fire.

a. Gas feed to burners.....

b. Pipe trench.....

c. Overhead piping.....

d. Overflowing tank truck.....

e. Floating roof crude tank.....

f. Cone roof gasoline tank.....

g. Hexane tank.....

h. Gasoline spill.....

i. High pressure pump.....

j. Propane .....

k. Heavy gas oil spray.....

l. Open barrel of asphalt.....

E. Class "A" Fires

1. Write after the following terms the numbers 1, 2, 3, 4, 5 or 6 indicating the order of increasing difficulty of ignition, assuming all to be derived from the same kind and condition of wood.

a. 12 x 12 timber.....

b. Wood flour (sander dust).....

c. Planer chips.....

d. 2- x 4-in. timber.....

e. 1- x 2-in. scantling.....

f. Sawdust .....

2. In the following list write "W" after the materials in which fires can be safely attacked with water.

a. Sulfur dust.....

b. Rubber tires.....

c. Lumber yard.....

d. Magnesium .....

e. Baled cotton or rags.....

f. A timber scaffold.....

g. Iron filings.....

h. Upholstery .....

F. Class "C" Fires

1. What special characteristics make CO_2 and dry chemical safe for use on Class "C" fires?.....

2. As a generalization, what is the best first step in fighting a Class "C" fire?

.....

3. If the Class "C" fire is too large to be handled with extinguishers, it may be safely attacked with what?.....

(Answers will be found on pages 36 and 37)

CHIEF
THIS IS FOR YOU!

The Scott Sling-Pak Speeds up Inspection Speeds up Plan of Attack

- ***On in Seconds***
- ***Light and Comfortable***
- ***Cool Fresh Air—No Chemicals***

Sling-Pak Model 6000-B4A

Chief, this is your personal Air-Pak! It has been designed especially for you. Modern fire-fighting calls for fire attack. This means you must get inside quickly to determine your plan of action.

The lightweight Scott Sling-Pak can be donned in seconds. It gives you a minimum of 15 minutes of breathing protection at extreme exertion. The Scottoramic mask gives you unlimited vision in all directions to help you appraise the situation quickly and make your decisions. Chief, if you haven't tried a Scott Sling-Pak, your nearest Scott Distributor will be glad to show one to you. Use it once and you'll wonder how you ever got along without it.

Scottoramic Mask

Write for literature and location of nearest Scott Distributor.

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Canada: Safety Supply Co., Toronto — Branches in Principal Cities

Export: Southern Oxygen Co., 250 West 57th Street, New York 19, N. Y.

Dates to Remember

Arizona: The Seventh Annual Arizona State Fire Training School will be held in Phoenix, October 15–17 at the Phoenix College. Write to Chief Jake Siken, Training Director, 49 South 1st Street, Phoenix, for information.

Arkansas: Regional fire schools will be held in Crossett, June 15–25; and Booneville, July 20–30. Write to Whit Murphy, Registrar, Arkansas State Fire College, State Education Building, Little Rock.

British Columbia: The Fire Chiefs' Annual Fire College will be held in Burnaby, August 19–21. For more details, write to H. K. Jenns, Supervisor, Traveling Instructional Units, Office of the Fire Marshal, 411 Dunsmuir Street, Vancouver 3.

California: The Sixth Annual Fire and Arson Investigation Seminar is scheduled for June 15–19 at the University of California in Los Angeles. Write to Thomas S. Ward, Supervisor of Fire Training, State Department of Education, 721 Capitol Avenue, Sacramento.

Florida: The Florida State Fire College in Ocala will feature a seminar in arson detection and investigation August 3–7. Write to W. H. Barnett, Superintendent, Florida State Fire College, Box 785, Ocala.

Idaho: The Annual State Fire School will be held August 13–15 in Boise. Write to Earl Robinson, Secretary-Treasurer, 212 South 16th Street, Boise, for further information.

Indiana: The 26th Annual Indiana State Fire School will be held at Purdue University, September 8–11. Write to Professor Shelby Gallien, Director, Public Safety Institute, Purdue University, Lafayette.

Iowa: Iowa State College in Ames will be the location for the Annual Fire School, June 16–19. Write to Keith Royer, Supervisor, Firemanship Training, 110 Marston Hall, Iowa State College, Ames.

Kansas: The 30th Annual Kansas Fire School will be held in Lawrence, October 19–22. For further information, write to Clyde A. Babb, Director, Kansas Fire School, University of Kansas, Lawrence.

Maryland: The Third Annual Aerial Ladder Short Course will be held at the University of Maryland August 3–5. Write to Robert C. Byrus, Director, Fire Service Extension Department, University of Maryland, Box 85, College Park.

Michigan: The Annual Fire College will be held June 16–19. Write to Francis Hartman, Supervisor, Firemanship, University of Michigan Extension Service, 1610 Washtenaw, Ann Arbor.

Missouri: The Ozark-Maries Fire Conference will be held June 21. The Annual Central Missouri Fire Conference is scheduled for July 24–26 at the University of Missouri. For more information, write to William Bush Walden, Administrative Assistant in Charge of Firemanship Training, University of Missouri, Building T-11, Room 101, Columbia.

New York: The 87th Annual Convention of the Firemen's Association of the State of New York will be held at the Hotel Woodruff, Watertown, August 16–21. For details, write to Secretary Eugene M. Braun, 4025 Main Street, Buffalo 26.

Oklahoma: A Fire Hazard Control Short Course is slated for June 15–26, in Stillwater. Write to R. J. Douglas, Head, Fire Protection Department, Oklahoma State University, Campus Fire Station, Stillwater.

Ontario: The following courses will be given at the 1959 Fire College in Gravenhurst: Advanced Fire Inspection Practices, June 15–July 3; Volunteer Fire Officers, Part I, July 6–10; Company Officers, July 13–24; and Administration Course for Senior Officers, August 10–24. Write to D. E. Barrett, Director, Ontario Fire College, P.O. Box 830, Gravenhurst.

Pennsylvania: A fire department pump school is scheduled for June 22. Special

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training courses will be given in advanced fire fighting, July 6 and ladder, rescue and salvage, July 20. Write to Art Espey, Director, Pennsylvania State Firemen's Training School, Box 631, Lewistown.

South Carolina: Regional fire schools will be held in Conway, July 20–24; and Hampton, July 27–31. Write to H. B. Wells, Instructor, Fire Fighter Training, 1539 Harrington Street, Newberry.

Tennessee: The 16th Annual Tennessee State Fire Service School will be held at the Tennessee Fire Training Center in Murfreesboro, August 17–21. Write to Homer S. Elkins, Itinerant Instructor-Coordinator, Tennessee State Fire School, 215 Chestnut Street, Chattanooga 3.

Texas: The 30th Annual Texas Firemen's Training School will be held July 19–24 at Texas A & M College. Write to Henry D. Smith, Chief, Firemen's Training School, Engineering Extension Service, College Station.

Virginia: The Fourth Annual Virginia Fire College will be held at the College of William and Mary in Williamsburg, June 22–26. Write to Chief Elliott W. Jayne, Director, Virginia Fire College, Williamsburg.

Washington: Bellingham will be the site of the Annual Fire Conference, July 22–25. Write to Mrs. Emma Ethier, Secretary, Washington State Firemen's Association, 3206 East 125th Street, Seattle 55.

West Virginia: The 29th Annual West Virginia Fire School in Morgantown will be held July 20–24. Write to R. E. Hanna, Jr., Director, West Virginia Fire School, West Virginia University, Morgantown.

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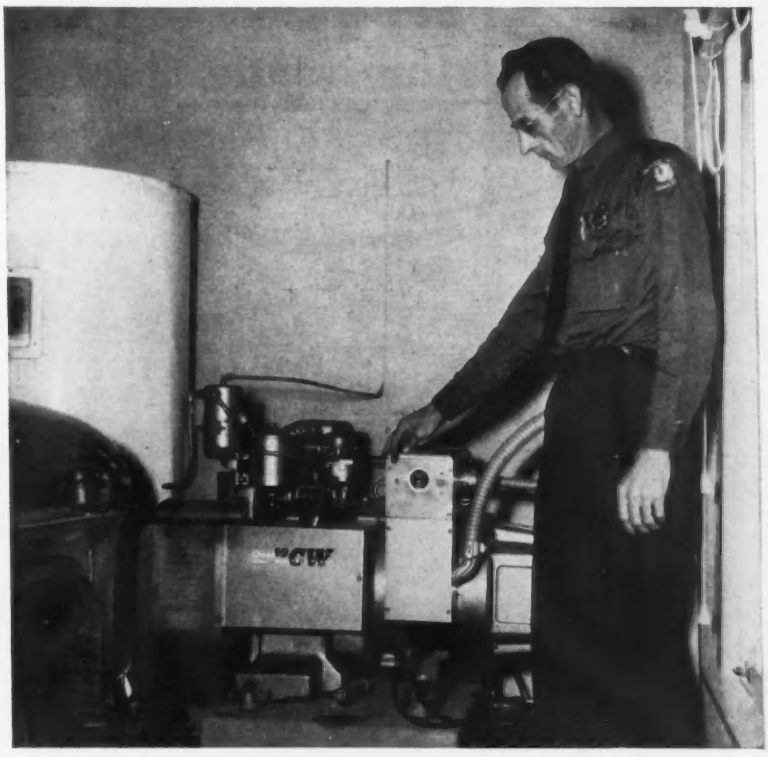

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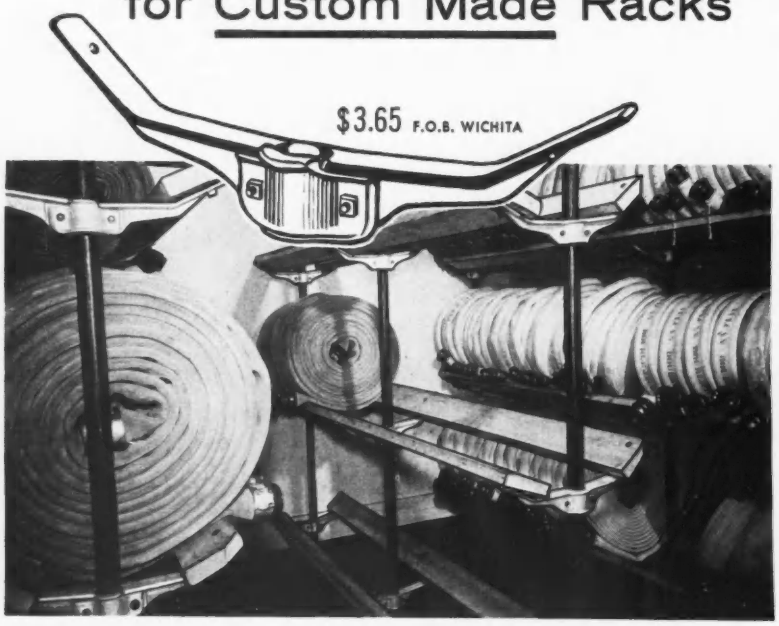

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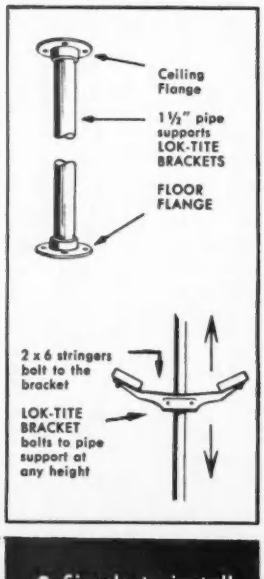
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Membership Report

NFPA Welcomes the following chiefs and fire departments who recently joined the Association. Are you encouraging fire departments in your State to join NFPA? We will send you membership application forms on request.

Colorado: Greeley Fire Department, Greeley.

Georgia: Hogansville Fire Department, Hogansville.

Iowa: Montezuma Volunteer Fire Department, Montezuma.

Maine: Augusta Fire Department, Augusta; Hermon Volunteer Fire Department, Bangor; Westbrook Fire Department, Westbrook.

Maryland: Calvert County Volunteer Fire Department, Inc., Prince Frederick; Waldorf Volunteer Fire Department, Waldorf.

New Jersey: Cranford Fire Department, Cranford.

New York: Danby Fire Department No. 1, Ithaca; Chief Augustine Rotunno, Millbrook Engine Hook & Ladder Company No. 1, Millbrook; Hook & Ladder Company No. 1, Inc., Oxford.

North Dakota: Glenburn Fire Department, Glenburn.

Ohio: Chief Everett L. Stemen, Elida Community Volunteer Fire Company, Inc., Elida; Garfield Heights Fire Department, Garfield Heights.

Ontario: Point Edward Voluntary Fire Department, Point Edward.

Pennsylvania: Stanford Hose Company, Corry.

Rhode Island: Wequetequock Volunteer Fire Company, Inc., Westerly.

Texas: City of Beaumont Fire Department, Beaumont.

Washington: Rochester Fire Department District No. 1, Rochester.

PROPOSAL

Sealed bids will be received by Borough Council of the Borough of Glenolden, Delaware County, Pennsylvania until 8 p.m. D.S.T., Thursday, July 30th, 1959, at a special meeting of Council to be held in the Council Chamber of the Glenolden Library Building, Glenolden, Pennsylvania at which time and place all bids will be publicly opened and read aloud for the sale of one (1) 1941 Seagrave Pumper, semi-cab, 500 G.P.M. with bronze pump equipped with 150 gal. booster tank, one (1) 28 ft. extension ladder and one (1) 14 ft. roof ladder.

This pumper may be inspected at any time in the Fire House of the Glenolden Fire Company No. 1, Glenolden, Pennsylvania at which time a list of equipment supplied with the truck will be furnished to prospective bidders.

A Certified Check or Bid Bond in the amount of $100 payable to the order of the Borough of Glenolden must accompany each proposal.

Borough Council reserves the right to reject any or all bids. Address all bids to the undersigned.

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Secretary of Council
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Neat Report by Volunteers

A SIMPLE, but informative, annual report for 1958 was issued by the Garner Volunteer Fire Department, Inc. of Garner, North Carolina. It was a four-page, 8½-by 11-in. folder which presented a summary of the fire department's activities, income and expenses for the fiscal year.

The first page of the folder had a photo of the department's headquarters and apparatus. Below this was a simple statement on "your fireman." The second page had four pictures with description of some pumpers and a tank truck used by the department. On the third page was a chart listing the number of fire alarms in a four-year period and a breakdown of the types of fires handled. In addition, there was a table of the valuation of property involved in these fires, the amount of damage caused by fire, and the savings to the community generally brought about by fire department response. This table was followed by an explanation on how the department was financed, what its operations meant in the reduction of insurance rates, and what two-way radio has meant to the department.

The back page of the report contained a financial statement for the preceding fiscal year together with the listing of officers and members of the department.

This is the sort of a bulletin that can gain a great deal of good will for a volunteer fire department. The average citizen does not object to contributing for fire department services as long as he knows that his money is used productively.

Exhibitors at IAFC Convention!

As this issue goes to press, little or no exhibit space is left in the Auditorium to be used for the IAFC Convention at Grand Rapids, August 31 to September 3. Chief L. Clyde Canning, in charge of exhibits, lists some 86 fire service equipment manufacturers and distributors already on record.

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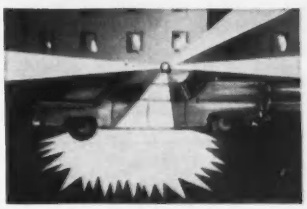

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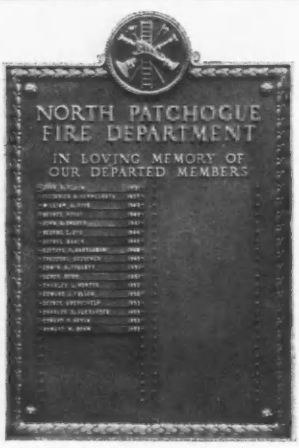

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Answers to Quiz on Pages 29 and 30

Primary Fire Protection

A. Flash Point

1. False. Actually, the flash point is only one of a number of very important measures of the potential fire hazard of a flammable liquid. Thus, a lubricating oil with less than one per cent of gasoline in it might give a flash point of approximately room temperature. However, the actual storage and handling of this oil would not introduce a serious hazard. The mobility of the vapors and their densities are similarly important factors.

2. Higher. Because the vapors are confined in the closed cup flash test, the tendency is to give a lower flash point.

3. 175°F. This is contained in the definition of flammable liquids and is specified by the ASTM (American Society for Testing Materials) in the descriptions of the two instruments.

4. False. Actually, two completely conscientious inspectors can obtain results that are 6°F apart on the same sample of a material which is normally tested in the Tag closed tester.

5. "F" is the flash point by the Tag closed cup method. "B" is the boiling point by the ASTM D-86 method or the true boiling point of pure compounds. It is important to remember that the flash point in this equation must be the Tag closed cup flash point. Flash points as determined on other instruments will give false values when used with this equation. However, of course, other equations could be set up for use with other instruments.

6. Lower than. The extent to which the flash point will be lower than the arithmetical mean will depend on the spread in flash points between the two compounds of a mixture. There will be a greater deviation if the flash points are wide apart than if they are close together.

7. No. Kindling temperature applies only to solid materials.

B. Flammable Limits

1. In order, the correct answers are "c," "b" and "a." The definitions are those which apply to these terms.

2. Reading from top to bottom in the column the correct order is "d," "a," "b" and "c."

C. Ignition Temperature

1. True. For example, in the case of gasoline, variations of as much as several hundred degrees can be obtained depending on the method of test.

2. The correct answer is "decreases" if we are discussing the ignition temperature under practical conditions. In the ASTM

apparatus the ignition delay is a very important factor and marked deviations from this general rule are found.

3. Higher. This is invariably true since it is necessary to generate vapors before they can be ignited.

4. Under the conditions specified in the question, the answers to "a," "b" and "c" are "heavy gas oil," "butane" and "butane."

D. Classification of Fires

1. The correct answers are given in the following tabulations.

a.	A	j.	C
b.	A	k.	A
c.	A	l.	C
d.	A	m.	B
e.	B	n.	C
f.	B	o.	A
g.	A	p.	A
h.	A	q.	B
i.	C	r.	B

2. a.	3	g.	2
b.	2	h.	2
c.	3	i.	3
d.	3	j.	3
e.	2	k.	3
f.	2	l.	2

E. Class "A" Fires

1. a.	6	d.	5
b.	1	e.	4
c.	3	f.	2

2. a.	W	e.	W
b.	W	f.	W
c.	W	g.	——
d.	——	h.	W

F. Class "C" Fires

1. They are non-conductive.

2. Kill circuits.

3. Water fog.

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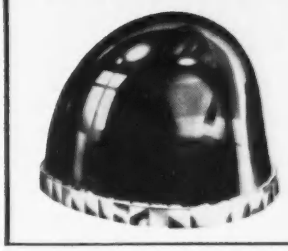

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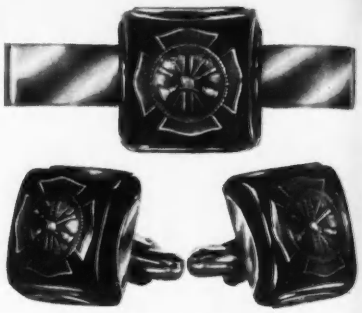
EQUIPMENT NEWS

New "Hoosier" Extinguisher

A new 2½ gallon, stainless steel, air-pressured water type extinguisher called "Hoosier" is announced by *Elkhart Brass Manufacturing Company, Inc.*, Elkhart, Indiana. Write manufacturer for complete details.

Fire prevention officers will be interested in bulletin F-45, describing and diagramming the No. 1 Fil-O-Matic Automatic Shut-Off Nozzle (UL) by *OPW Corporation*, 2735 Colerain Avenue, Cincinnati 25, Ohio. . . . The "Roto-Flash" is a new type of 360° revolving Seal-Beam light for vehicles. *Trippe Manufacturing Company*, Dept. RF-F, 133 North Jefferson Street, Chicago 6, Illinois, has a beautiful catalog in colors for you. . . . Production of a one-man Roll-In Cot, doubling as a two-wheel stretcher, is announced by *Ferno Manufacturing Company*, 6th and Pine Streets, Greenfield, Ohio. . . . An inexpensive alert device for mobile dial direct radio-telephone systems has been developed by *Monitoradio Division, I.D.E.A., Inc.*, 7900 Pendleton Pike, Indianapolis 26, Indiana. Model AA-1 "Horn Beeper" may be used to actuate intermittently any type of alarm where continuous operation is not desirable.



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High quality jewelry in the fire fighter motif is outstanding in these striking tie clasps and cuff links. For the ladies, there are earrings, bracelets and a diamond-shaped key chain. Motifs embedded in two-tone black and white lucite on rhodium-plated base include fireman's scramble (in photo), fire ax, alarm box, hydrant, helmet and fire engine. Your organization can make money selling these unusual items, too. Write to *Hook-Fast Specialties, Inc.*, P.O. Box 1425F, Providence, Rhode Island.

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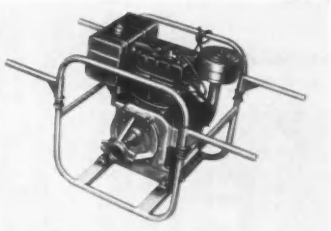

New Portable Fire Pump

This No. FS-100-P Fire Pump, a portable, folding-handle unit for forestry service and fire fighting in remote areas, is announced by *F. E. Myers & Brother Company*, Ashland, Ohio. Write for descriptive catalog page.

To eliminate loss of labels and tags on your equipment, try using waterproof Reynolds Stencil Inks in Spray Cans. Write to Mr. V. M. Cannon, *Reynolds Ink, Inc.*, 4500 Euclid Avenue, Cleveland 3, Ohio. . . . *Ansul's* new 2½-pound dry chemical extinguisher, the "Monitor," resembles a bright-red cannon ball, spherical in design and one-hand operation. . . . Interested in portable soundcasting systems? A new illustrated, eight-page catalog is yours from Mr. Frederic Zeller, *University Loudspeakers, Inc.*, 80 South Kensico Avenue, White Plains, New York.

BUYING NEW EQUIPMENT?

Consider the products advertised in this issue.

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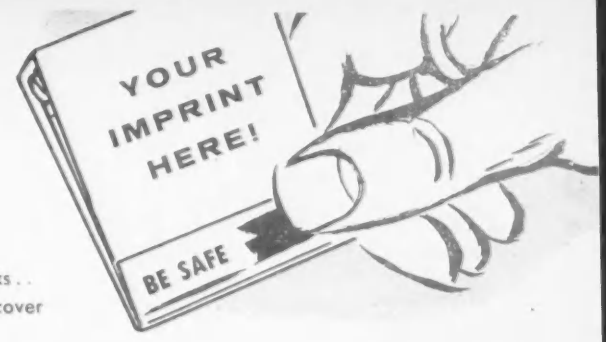
FIGHTING FIRE WITH FIRE
-REALLY WORKS-



HERE'S HOW you fight fire with fire when you use N.F.P.A. match books.. Your message comes first, backed up by Sparky who uses the back cover to say..."Don't Give Fire a Place to Start".

Five different inside cover designs are mixed into each case, and each design points up a fire hazard or a place where fire could start if Sparky's advice is not heeded.

ORGANIZED 1896

NFPA

INCORPORATED IN 1930

"PLAY IT SAFE!"

Before You Light it...
Be Sure Your Stove is Working Properly
Keep Matches Away from Young Children!
Kill the Match- Kill the Smoke- Before they
Where Did Your Match Go?
Check One
HERE
OR HERE

National Fire Prevention Week is October 4 to 10, 1959. It takes 30 to 35 days to process orders. All orders received before the first day of September can be shipped to arrive before October 4th, but DON'T DELAY. Order today for use in advance of the National Fire prevention Week Activities.

PLAY IT SAFE
and advertise
with
N.F.P.A.
Match Books
ALL-WAYS!

Each case of match books has in it suggested distribution plans to help you reach many thousands with your message.

ORDER FORM

MAKE CHECKS PAYABLE TO: "SPARKY" Match Program and mail to:

SPARKY Match Program
Attention M. Netzorg
815 Washington,
Newtonville 60, Mass.

Because of freight and tax complications shipments are restricted to continental U.S.A.

Gentlemen:
Please ship us ..... cases of SPARKY Match Books with our imprint on the front cover, as indicated below:

IMPRINTING INSTRUCTIONS

_____

_____

_____

_____

PRICE SCHEDULE

No. Cases	No. Books	Price Per Case	Total Price*
1	2,500	$27.50	$ 27.50
2	5,000	24.50	49.00
4	10,000	21.25	85.00
12	30,000	19.85	238.20
25	62,500	19.50	487.50

Add local or state sales and use taxes. Prices include prepaid freight and Federal Excise Tax.

(*) These low prices are possible because of NFPA's quantity buying.

(SIGNATURE) .....

CHECK MUST ACCOMPANY EVERY ORDER — NO C.O.D. ORDERS

Please attach your letterhead. If shipment is to an address other than that shown above, indicate on your letterhead the address to which shipment should be sent. Thank you.

USE THIS ORDER FORM...TODAY!

GOODALL "RED-FLEX"

World's Finest Lightweight

NEOPRENE COVERED FIRE HOSE

Latest Addition to the Modern "FIRE-FLEX" *Line*

U.S. PATENT NO. 2392967

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MILDEW-PROOFED **NO MECHANICAL DRYERS**

WATER-PROOFED **NO HUMIDITY MACHINES**

NO HOSE TOWERS **NO EXCESSIVE SPARES**

Because "RED-FLEX" *Stays Dry!*

CHEMICAL, OIL AND GREASE RESISTANT

STANDARD SIZES... 400 LB. TEST

Hose Size	Wgt., 50', Uncoupl'd	50" Coil Diameter
1½"	20 lbs.	19"
2"	29½ lbs.	21"
2½"	37 lbs.	21"

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Gentlemen:
☐ Send complete information on "RED-FLEX" Fire Hose
☐ Have representative call with details and prices.
Company_____
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City_____ Zone_____ State_____
Attention of_____

Standard of Quality—Since 1870

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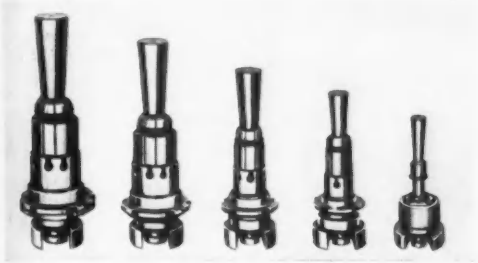
ELKHART'S IMPROVED
HAN-DRAULIC
EXPANDER
(Formerly Bell and Pihl)

for attaching expansion ring couplings...

Han-Draulic combines the compact, portable advantages of a hand expander with the smooth, controlled power of hydraulic pressure in one complete unit. Plus this, the HAN-DRAULIC Expander has been re-designed to use Elkhart's patented mandrel and segment holder. Segments from ¾" to 3" can be quickly changed as needed by merely slipping the mandrel and segment holder in and out of the power unit.



Elkhart's patented individual size segments with mandrels for use with Han-Draulic Expander in these sizes: ¾", 1", 1¼", 1½", 2", 2½", 3".

No. 422

More uniformity with hydraulic power

The Han-Draulic Expander utilizes hydraulic pressure to exert a smooth flow of power on the mandrel to expand the expansion ring in the fire hose coupling. This same easy action withdraws the mandrel. Check of gauge permits more uniformity in attaching couplings.

Portable

Han-Draulic is not limited to permanent bench or stand mounting. It can be easily moved from one station to another thereby eliminating necessity of trucking hose to a central location.

More units in department

Because of its modest price, Han-Draulic is a practical choice for multiple units in fire departments. Ideal for small department where large unit was not practical.

Choice of mounting

Han-Draulic complete with stand has a storage shelf for holding individual segments. Han-Draulic can be ordered without stand.

Positive positioning

New stop automatically aligns slots for easier change of segments. Positioning pin prevents any chance for damage to segment.

Elkhart's Two-Prong Expansion Ring Extractor No. 428

NEW IDEA in expansion ring extractors

By twisting rather than hammering or prying, Elkhart's new No. 428, double prong, expansion ring extractor frees rings without slipping or damaging coupling. Makes the job easier—saves bruised knuckles too. Prongs of ground and hardened steel, chromium plated.

ELKHART BRASS MFG. CO., Inc.

ELKHART, INDIANA

More Than Half A Century of Fire Fighting Progress

"Little Mo" a Fast, Effective Fire Fighter by . . . AMERICAN LAFRANCE

It has no equal for Airports, Thru-ways, Structural, grass or brush and flammable liquid fires

● ● ● "Little Mo" has proven its versatility and ability to pack a mighty wallop for all types of fire fighting. "Little Mo" is a basic development by "Army" Armstrong to meet the need for a fast, light, compact, low cost fire fighting unit. "Little Mo" has proven its ability during the past several years to produce outstanding results. By exclusive agreement with Mr. Armstrong, this efficient fire fighter is now being produced by American LaFrance.

● ● ● The chassis is 4 x 4 all wheel drive powered by a 205 Brake Horsepower V-8 engine for fast acceleration and operation over all types of terrain. The chassis is Dodge Model 205 built to American LaFrance specifications for this specific fire service use.

● ● ● The pump is 2-stage for operation at all pressures to 600 p.s.i. The pump is capable of operation at all driving speeds to permit turret or hand line use with the vehicle in motion. The turret is one man control from within the cab. The turret can be operated by the driver. Turret discharge rating is 90 g.p.m. The turret discharges a water straight stream or fog pattern; air foam straight stream or fog-foam; wetter water, either straight stream or fog.

● ● ● The water tank is 200 gallon capacity. 20 gallons of air foam liquid and 5 gallons of wetting agent are each carried in a separate neoprene tank. Any of these fire extinguishing agents are available for immediate use as required. All tank fills are easily accessible for refilling supply. Air foam and wetting agent are automatically proportioned correctly by fixed orifice plates without any adjustment required. Simplicity of control is an important feature of "Little Mo."

● ● ● Water, air foam, or wetting agent can be discharged through the two front bumper fog nozzles or the hand lines. Two reels, each carrying 150 feet of ¾ inch high pressure hose are provided. The hand line nozzles provide either straight stream or fog. A bayonet piercing nozzle is also provided for use in stacked or baled materials. One 1½ inch ball type discharge gate is provided for use of 1½ inch hose if desired.

● ● ● For real performance at low cost and minimum manpower, you can't beat "Little Mo." Write for detailed specifications.

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A DIVISION OF STERLING PRECISION CORPORATION
ELMIRA, N.Y., U.S.A.

LAFRANCE FIRE ENGINE — FOAMITE LIMITED

TORONTO 9, ONTARIO, CANADA

Powhatan's DURA-FOG Nozzle

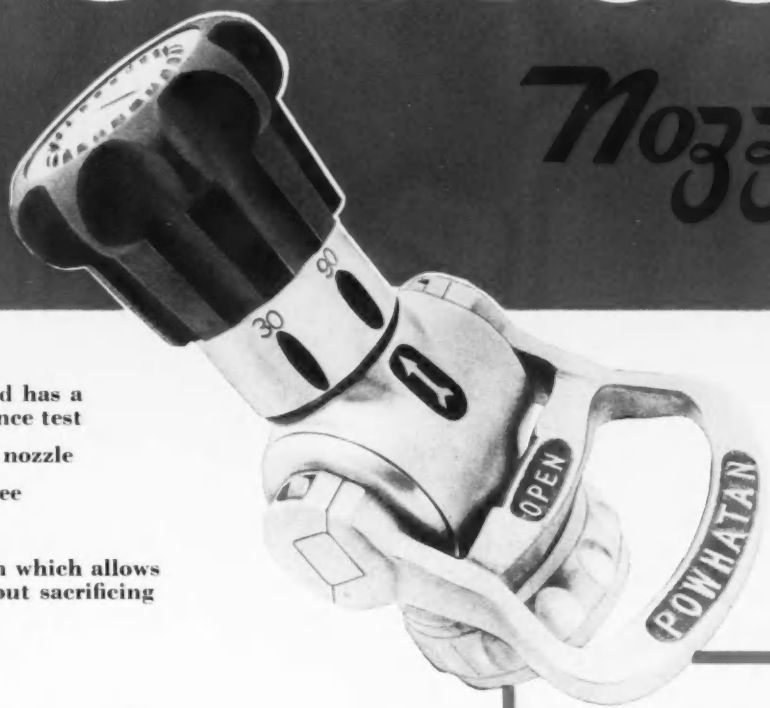

PLATE NO. 261

- Each nozzle sold has a 100% performance test
- A strong husky nozzle
- Maintenance free
- Greater reach
- Finer dispersion which allows less GPM without sacrificing effectiveness
- Denser curtain
- No kickback
- Operates easily under high pressure

CHOICE OF SWIVEL OR SOLID BASE

TRY IT OUT!

You can — by simply writing us and telling us you want to see and test it. Write today!

OVER A MILLION SHUT-OFFS AND NEVER A LEAK!

Dura-Fog Nozzles have been thoroughly bench tested, to assure dependability. We strived for 250,000 shut-offs, actually tests have gone over a million with no leak!

FLOW IN GPM AT 100 PSI NOZZLE PRESSURE

Size	Straight Stream	30° Fog Pattern	60° Fog Pattern	90° Fog Pattern
1"	20	22	32	35
1½" -60	57	60	72	88
1½" -100	95	100	105	107
2½"	135	165	190	225

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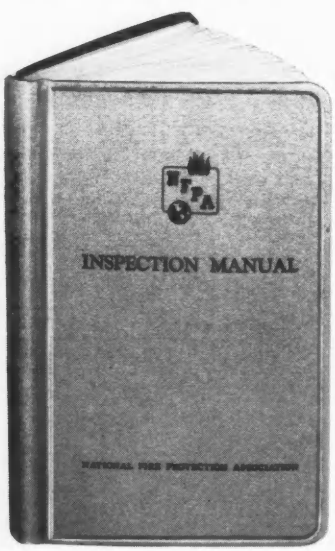
For fire department inspectors . . .

NFPA INSPECTION MANUAL

SECOND EDITION



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Much new material has been written for this 1959 edition, particular such subjects as smoke pipe clearances, resins and plastics, radioactiv materials, pyrophoric metals, flamespread rating, and extinguisher testin and rating. A number of new tables are included together with standar plan symbols in full color.

Particular attention is given to inspection procedure, what to loo for in various occupancies, heating hazards, inspection of protective equip ment, what "approvals" mean, and how to make plans and reports.

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